Between Two Worlds

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The need for such a research study was determined by a group of medical specialists, headed by Dr. W.C. Taylor, Department of Pediatrics, University of Alberta.

The Institute is grateful for the cooperation of Dr. B. Scott Leslie, Senior Staff Medical Officer, Medical Services Branch, the Federal Government Department of Health and Welfare Canada in obtaining a release of copyright in order that the Institute may publish this document.

The Boreal Institute for Northern Studies believes that this study will be invaluable in providing much needed medical information with respect to health care for Canada's northern native peoples.

We at the Institute are very pleased that a follow-up study funded by the Donner Canadian Foundation is now taking place under the direction of Dr. D.W. Spady. The Boreal Institute will publish the findings of the follow-up study soon after its completion, which is expected to be in 1983.

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BETWEEN TWO WORLDS

The Report of the Northwest Territories Perinatal and Infant Mortality and Morbidity Study

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PREFACE

This is a long document. It is hard to read, largely because it is full of facts and figures presented mostly as tables. Although it may be difficult to read, it has been far more difficult to write. It is the work of a group of people who at times despaired of ever seeing any tangible proof of their many evenings and weekends of planning, discussing, arguing, working together, working apart, analyzing, writing and rewriting. Much of this work was done using the "spare time" of these individuals and this, in part, accounts for some of the time delay between receipt of the data and general release of this document. The contributions of most of these people have been acknowledged in the preceding pages but I want to express special thanks to some of these and others who are not included in that listing: Mrs. L. Trafford who conscientiously kept the minutes of many, many meetings; Mrs Gail Kelly, who typed the manuscript, and in doing so learned the benefits of computerized text editing; the University of Alberta Computing Services which provided a large amount of computer time for the analysis of the data; Mr. Dan Precht, who helped solve many problems with SPSS; Drs. K. Bayh and C. Hazlett who patiently provided me with advice about data analysis which I did not always take; Dr. E.E. McCoy who gave me the time to work on this document and Dr. W.C. Taylor who helped me to get involved in the first place. I want to express my thanks to the Government of Canada who initially provided the funds for this research to be performed with the aid of a National Health Grant (DNHW Project No.610-7-4). Mr. R. Jamieson, Director of the Boreal Institute for Northern Studies, Mr. K. Bodden, Research Associate and the Advisory Board of the Institute deserve special thanks and appreciation for their assistance, encouragement and financial aid in the preparation and publication of this document. Finally, I want to thank Mrs. G.A. Cooke, Chief Librarian of the Boreal Institute for Northern Studies, for her invaluable contribution of editing the final manuscript and making it ready for publication.

D. W. Spady
1981

SUMMARY

by D.W. Spady

The impetus for this report was the observation that Inuit and Indian infants living in the Northwest Territories (NWT) had a much higher frequency of morbidity and mortality than did White infants. The objective of this report is to answer the question "Why such a difference?" The method used to try and answer this question was a prospective observational study of the gestation and first twelve months of life of all infants born in the Northwest Territories over a twelve month period. During this time information was collected describing the socio-economic and cultural environment of the infant and his family, his feeding practices and those of his family, his medical contacts for the purposes of preventive health care or diagnosis and treatment, his illnesses and, in some cases, the reasons for his death. The purpose of the next few pages is to present a brief outline of the findings of this study.

There were 1191 infants initially enrolled in this study. They constitute all the infants born in the NWT during the time period April 1, 1973 to March 31, 1974, plus infants born during the same time period outside the NWT but whose parents normally resided in the Territories. In order to better define the infants of this study the traditional population grouping was replaced with a more socio-ethnically ordered classification: the Inuit, Indian[1], White, Mixed and Other groups. The first three groups, with 449, 268, and 361 infants respectively, constituted 91 percent of the total population and in this summary will be the only groups discussed. The small size of the two remaining groups precluded detailed data analysis; however, for the most part the conclusions relating to the White group are applicable to these two groups.

Although living in comparable northern latitudes, the microenvironments of the three groups differed in many ways. Nearly 90 percent of Inuit infants lived in the more remote zones of Baffin and Keewatin or in the high reaches of Mackenzie zone. Over three-quarters lived in small communities of less than 1500 people. Regular plane flights were common but not frequent, and access to definitive medical care by a physician was at least half a day away for over one quarter of the population. In most cases the medical facility available for routine health care was a nursing station staffed by one or more nurses.

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[1] Some readers may question why the term Indian was used and not Dene. The Federal classification of ethnicity recognizes the term Indian but not, at present, the term Dene. Additionally, although the vast majority of Indians in the NWT belong to the Dene Nation, not all do and hence these Indians would be misnamed.

All of the Indian infants and their families lived in the Mackenzie valley region of the NWT and tended to live in communities which were larger and more settled. Regular plane flights and access to a doctor was more common among this group. The usual medical facility available was a hospital, but in nearly 40 percent of cases a nursing station was the most accessible facility.

The families of White infants lived in all areas of the Territories; however, the majority lived in towns along the Mackenzie river in Inuvik and Mackenzie zones. Most resided in towns of over 1500 population and lived in a microenvironment not unlike that of Southern Canada.

Nearly all the Inuit and Indian mothers and fathers had lived for their entire lives in the NWT. Among the Whites this was a rarity, most having lived in the NWT for less than 5 years.

The 1191 infants were the products of 1179 pregnancies; there were 12 sets of twins. This was the first pregnancy for nearly 40 percent of the White mothers, but it was the first pregnancy for less than 30 percent of Native (Inuit and Indian) mothers. Nearly one-quarter of all pregnancies occurred in mothers who had had over four previous pregnancies; just about all of these were in Native mothers.

While the average age of the mother was similar for the three groups, there were more teenage or elderly Native mothers than White mothers. In this respect it must be noted that there were four times as many single Native mothers than White mothers. Prenatal illness was more common among the Native mothers than among Whites and, among Inuit mothers especially, there was a high frequency of history of stillbirth and neonatal deaths. These are all factors which tend to place the Native mother at a high risk of developing problems during the pregnancy and at parturition. Obviously it was this group that required good prenatal care.

The amount of prenatal care varied significantly between the ethnic groups. The White mother received prenatal care at a level generally similar to that elsewhere in Canada, whereas the Indian mother very often tended to default and attended prenatal clinics infrequently and irregularly. In contrast to the Indian mothers, the Inuit mothers were very cooperative and faithfully and more frequently attended prenatal clinics. These patterns in the use of medical facilities by the Inuit and Indian groups were repeatedly observed throughout the study. Inuit families tended to use preventive and therapeutic medical facilities to a large extent, whereas Indian families tended not to use these facilities, especially for preventive medical care. The level of prenatal care rendered appeared satisfactory; however, there was some evidence to indicate poor record keeping and in detection or recording of significant risk factors. The degree to which this influenced the outcome of pregnancy could not be assessed. In all three groups there was a significant amount of concurrent non-obstetric and obstetric illness. This was usually of a minor nature but was occasionally serious and even life-threatening.

Nearly 70 percent of Inuit infants were born in hospital, while over 85 percent of Indians and over 95 percent of White infants were. Most White, but less than 70 percent of Indian or Inuit, infants were delivered by a physician. Five northern centres accounted for nearly 74 percent of all births in the NWT.

Most infants did well at birth although nearly 5 percent required hospitalization for various reasons--usually infections, congenital defects, or other problems peculiar to the newborn. Nearly 40 percent of those infants hospitalized required transferral to a Southern hospital for more intensive care.

Detailed analysis of the events occurring during pregnancy, delivery, and the care of the newborn emphasized the need for the medical professional working in the NWT to be versed in the diagnosis and management of problems of pregnancy, delivery and the care of the newborn infant.

Birthweight is an important index of newborn health. Native infants were significantly lighter in mean birthweight than White infants. The degree to which genetics and environment interact to influence birthweight is not easily measured, but it was apparent that maternal smoking, maternal pre-pregnancy weight and maternal weight gain in pregnancy were important, and to some degree modifiable, factors.

Nearly 16 percent of Inuit infants and 6 percent of Indian infants, but only one percent of White infants, were placed for adoption at birth. Among the Inuit and Indian infants many were adopted to relatives of the mother. Although adoption was not particularly common, separation for various reasons occurred in nearly 40 percent of Inuit and Indian infants; but in only 3 percent of White infants was care not given by the natural mother.

Traditional child care patterns were more commonly seen among Inuit mothers than Indian mothers. Most Inuit infants were carried in the Amauti or backpack for at least the first year. In contrast, nearly one half of Indian infants were not regularly carried about on the back of their mother, and less than 20 percent received such attention for the entire first year. The Inuit mother tended to use home-made clothes both for herself and her infant much more commonly than did the Indian or White mother. For the most part, in all three groups, the clothing was kept clean and in good repair and the general level of child care was felt to be satisfactory, although in about 10 percent of Inuit and Indian infants there was some evidence of child neglect.

One very important traditional child care pattern is breast feeding. Breast feeding, which is the traditional way of infant nutrition for all mankind, has been shown throughout the world to be of immense nutritional, immunological and psychological benefit. Nearly 60 percent of Inuit mothers breast fed their infants. In contrast, only about 30 percent of Indian infants and 50 percent of White infants were breast fed. Data relating morbidity patterns and breast feeding showed this cultural practice to be an important factor in the reduction of the frequency of illness among all three ethnic groups.

The practice of breast feeding was shown to be related to a number of social factors. It was the young mother, the mother who consumed alcohol, who lived in larger communities and who was dependent on store-bought foods, who tended not to breast feed. This is a distressing set of statistics, because these are the mothers of the future, and the trend away from nursing, seen especially among the Indian mothers, must be reversed.

The Native infants were often born into large families who lived in small, crowded homes which lacked many of the facilities considered essential by "Southern Canadian" standards and which would in many cases be considered primitive by most Canadians. Between 12 and 14 percent of Native families lived in housing considered crowded and of poor quality. Although in most families water was delivered year round, in only the White group was "running water" the rule rather than the exception. Indoor flush toilets and bathtubs were the norm in over 90 percent of White families but were rare among Native families. It is apparent that the Native family was at a distinct disadvantage with regard to the ease of obtaining and maintaining satisfactory hygiene.

The White infant was commonly born into a family with relatively high economic standing. Most White fathers were employed full time and earned a satisfactory income. Few White families ever received welfare, but nearly 50 percent of Indian and Inuit families did so. Food shortages were unheard of among White families, but in 23 percent of Inuit families and 12 percent of Indian families it was a periodic fact of life. Less than 50 percent of Native fathers had full time employment and cash income was much less; however, in many cases this was counter balanced by hunting and trapping.

Alcohol consumption was an important practice influencing many aspects of health. It was most common in Indian and White families, but even among many Inuit families it appeared to be a significant social problem and one which contributed to a number of infant deaths.

The sketchy data presented above point out the marked differences between these three groups. The White infant lived in an environment similar to that of an infant living in a rural environment in Southern Canada. The Inuit infant lived in circumstances unlike those of his parents when they were children yet his family retained many traditional practices, such as living in small settlements, carrying the infant in a backpack, making the infant's clothes, engaging in hunting and fishing, eating native foods and breastfeeding the infant. The Indian infant lived in a mixed environment, one not conducive to retaining the old ways but not the White mans' environment either. He usually lived in larger towns and had relatively easy access to a physician's care. Yet, in contrast to the Inuit, he was not usually breast fed, he was clothed more often in store bought clothes, and his family more often ate store bought food. In contrast to the White infant, the father was not usually steadily employed, the family was more commonly on welfare, and alcohol consumption was significantly greater than among the Whites or Inuit. The Indian infant lived in an environment that was "in-between" the old and the new.

Compared to the White population, deaths were much more common among the Native groups. Overall, there were 62 deaths; of these 13 were stillbirths, 16 were in the first week of life, and 33 in the remainder of the year. Among the 364 live births of White infants there were only 3 deaths, all within the first month of life and all due to untreatable congenital malformations. This may be compared to the 32 deaths among the 444 liveborn Inuit infants and the 13 deaths among the 268 liveborn Indian infants. Among the 102 infants in the Mixed and Other groups there was only 1 death and that occurred in the first week of life. Some of these deaths were inevitable. This was especially apparent in the first week of life when prematurity and congenital malformations took their toll, but also among some of the deaths occurring later in the year. Some of these deaths could have been avoided had the infant received intensive and specialized medical and nursing care, such as might be found in large hospitals in Southern Canada, but which is impractical in the NWT. Finally, and unfortunately, there were some deaths which should not have occurred; deaths apparently due to the parents bringing their child to the nurse or doctor too late for necessary care, to the non-recognition by the doctor or nurse of the nature or degree of illness of an infant and, to child neglect.

The perinatal death rates for the White, Indian, and Inuit groups were 10/1000, 28/1000 and 40/1000 respectively. These may be compared to the all-Canada perinatal death rate in 1973 of 17.6/1000. Thus, even allowing for fluctuation due to small sample size, the perinatal death rate is significantly higher for Native infants and Inuit infants in particular. Some factors which appeared to be significantly associated with these deaths are maternal age, especially teenage mothers; inadequate prenatal care; low birth weight; and inappropriate or insufficiently aggressive care of the sick newborn. By themselves, any one of these factors can be of great importance in determining the outcome of pregnancy and delivery. All too often they acted in tandem in the same mother to increase the odds of a poor outcome. For example, the teenage mother might be single, might want to hide her pregnancy and hence would not attend prenatal clinics. In addition, she and her unborn infant are at nutritional risk because of her adolescence as well as her pregnancy.

Basic care of the newborn should be within the competence of all who manage pregnancy and parturition yet, in the analysis of some of the deaths occurring in this study, it became apparent that newborn care was insufficient or inappropriate, even when allowing for the inevitable lack of sophisticated facilities inherent in a small hospital. Although evacuation of infants and/or their pregnant mothers was carried out fairly frequently, there were times when evacuation should have been implemented and was not, or it was implemented too late to be of use. One factor which was a determinant of perinatal death was the use, or non-use, of Caesarian section as a method of delivery. But is Caesarian section appropriate when the mother has to return to a remote Arctic settlement where each subsequent pregnancy will require evacuation to a hospital for delivery; evacuation which is not desirable and sometimes not possible?

The above discussion has centred about the social and environmental factors which influence perinatal deaths. In many cases, e.g. extremes of maternal age, prenatal care, these are not problems solvable by increasing medical facilites or personnel. In some instances, such as low birth weight infants, the social and environmental factors cannot be separated from the biological ones, yet even here improvements are possible. Finally, in the management of labour and the care of the newborn, the skill and wisdom of the practitioner at hand is as important as any sophisticated facility. This knowledge can be improved by further training and education and supported by adequate facilites and ease of expert consultation.

There were 33 deaths after the first week of life; 24 Inuit, 8 Indian, 1 White. Overall the Infant Mortality Rate (IMR) for Inuit was 72.1/1000, for Indians 48.5/1000 and for Whites 8.2/1000. This compares to an all-Canada IMR of 15.5/1000 in 1973. Thus it is clear that, as with perinatal deaths, the Native infant, and again especially the Inuit, was at a particularly high risk of death. The small numbers of deaths precluded detailed statistical analysis but did not prevent individual case review. This review was carried out by a small expert committee whose role was to review all deaths, ascertain the circumstances and cause of death, summarize their findings in a manner designed to be helpful to those working in the field, and make constructive criticism of medical management when warranted.

Eighteen of the post-perinatal deaths were due primarily to infectious illnesses; 8 were sudden unexpected "cot" deaths; 4 were due to congenital defects and 3 to other causes. Respiratory disease was the most common cause of death.

The Committee discovered a number of important factors associated with death. At least 4 deaths occurred while the children were living in isolated bush camps, away from easy access to medical personnel[1]. or ready transportation. In one bush death, the parents had been advised of the dangers of keeping their child in such primitive conditions, yet they persisted in doing so. It is unlikely these children would have died had they been in settlements at the onset of illness; thus, although "preventable" in the strict sense, these deaths were inevitable given the way of life of their families.

In some cases the infants died even while receiving outpatient or inpatient therapy in a nursing station or hospital. A feature of these deaths was the rapidity with which an apparently innocuous illness became a lethal disease. These deaths underline the difficulty of recognizing the point in time when a relatively minor complaint becomes a serious illness likely to lead to death. Some of these deaths were due to illnesses that had not been suspected. An outstanding example of this is a death from meningitis in an infant who had been undiagnosed but in hospital for a number of days prior to death.

These events emphasize the need for (a) the medical attendant to be trained to recognize the signs and symptoms of serious illness in infants; (b) early consultation if at all possible in any case which is atypical, or where there is cause for concern, or which does not resolve within an appropriate time period; and (c) evacuation to a larger centre sooner, rather than later, in the course of the disease.

A factor, not unique to those infants who died, but common to all infants who were inpatients in small nursing stations, is the difficuly or reluctance of nurses to admit infants to the nursing station for observation. This is a problem especially in nursing stations with only one nurse who, if she has a sick patient to manage, can rapidly become fatigued.

Cot deaths, or sudden unexpected deaths constituted the second largest general category of infant deaths. An important feature of these deaths is that a number of them appeared to be due to overlaying by the parents, who often had been drinking, while sleeping-in the same bed as the infant.

It is clear from this rather cursory overview that many of the deaths were preventable; preventable by having the parent bring the child to health care earlier in the disease; preventable by ensuring that medical personnel can recognize and effectively deal with serious illness; preventable also, although in a less definable way, by the gradual change of the social and economic environment and cultural attitudes of each ethnic group such that their lifestyles are adapted more harmoniously to their new environment.

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[1] In the context of this report, "medical personnel" refers to individuals providing some form of health care to the patient. They may be doctors, nurses, community health workers or health aides.

Death is an easily measurable parameter and one which, in the form of various statistics, is used throughout the world as an index of health. In many ways death is one of the easier forms of "illness" to prevent and the dramatic decline in infant mortality in the NWT over the past quarter century is strong testament to the effectiveness of medical facilities and personnel. However, infant morbidity, which is far more common and equally important, has not declined appreciably, if at all.

At the time of the study, health care facilities were available throughout the Territories, and they were well used, especially by the Inuit, less so by the Indian and White families. The data of this study would suggest that there is no need to increase the number or size of pediatric health care facilities in the smaller settlements of the NWT. However, there is evidence to suggest that there is a need to improve the pediatric expertise of medical personnel staffing all levels of medical facilities in the NWT.

Among the three ethnic groups the Inuit had the greatest frequency of illness and also the greatest frequency of use of preventive health services, such as prenatal care and well baby visits. It was the Indian group that utilized preventive medical services the least, yet they had the second greatest frequency of illness. Compared to the Inuit, when their overall health status was estimated using a composite health score, there was no difference between the groups and both were significantly less healthy than the group of White infants.

Overall, there were over 10,000 episodes of illness occurring in the total study sample - for an average of nearly ten illnesses per infant. There was a large variety of types of illness, although the most common and important were infectious in nature and were mild and self-limited. Two major groups of disease, pulmonary infection and gastrointestinal infection were common among the Native groups and were responsible for a number of deaths. Nearly one-quarter of White infants, but over one-half of Native infants, required hospitalization for various reasons. Over 80 percent of the hospitalizations were in NWT hospitals. The remainder were transferrals or evacuations to larger hospitals in Southern Canada.

The wide variety of illnesses of all degrees of severity, which occurred in the infants of this study, emphasizes the need for all medical professionals engaged in health care delivery in the NWT to be well trained in basic pediatrics. In addition, the hospitals in the NWT, which accept the sick infant, must be equipped with the necessary facilities to provide for the routine care of this child and they must be staffed with physicians who have extra training in pediatrics.

One important observation arising out of this study was that the frequency of health care visits and illnesses varied considerably with settlement size. The smaller settlements had better attendance for preventive health care, slightly better immunization status and a greater frequency of illness episodes, but there were no strong differences in composite health status.

The above observations suggest that: (a) the Inuit tend to utilize health care facilities well and Indians to underutilize them; (b) utilization of health care facilities is inversely related to settlement size; and (c) the existence of health care facilities per se is not sufficient to ensure adequate health for a population. The fact that the White infant had much less illness, although he had access to almost the same medical facilities, suggests that some other factor is influencing health status. It appears that one of the crucial factors is the environment in which the infant is reared.

An attempt was made to determine those aspects of the environment which appeared to influence child health. Analysis of the data showed that for Native infants good health was associated with more traditional child care, such as breast feeding, carrying the child in the Amauti or backpack, maintaining traditional living arrangements, including crowded houses, and with good employment of the fathers. In addition, for Indian infants good health was associated with non use of a public water supply, abstinence from liquor consumption, residence in larger, more accessible settlements, and with few other children in the home. White infants more commonly enjoyed good health when they lived in the more populated health zones and when they were nursed by mothers who stayed home to take care of them. It must be remembered that the above are statistical associations and should not be interpreted as cause and effect relationships.

The economic basis for life in the Northwest Territories was at one time that of fishing, and then by trapping, barter, and trade, but now is that of a cash economy. Hunting and trapping still exist, but on a much smaller scale. The large influx of White society to the NWT has brought great social change. This change in lifestyle is not just economic, it is a total change toward the way of life of Southern Canada. It is here that the White infant is at an advantage. Were he to live in traditional native conditions, he might be the high risk infant but instead his environment, governed by the demands, expectations and educational and financial abilities of his parents, is substantially similar to that of his Southern counterparts. On the other hand, the Indian and Inuit groups are finding their environment changing and are being required to change their way of life. Such a change is inevitable, is not easy., and is not merely a matter of finances. Rather it is a total acculturation requiring generations to accomplish and encompassing employment, education, housing, expectations, attitudes, and acceptance by all involved. Where possible this process of acculturation, in order to retain and encourage cultural identity and self-respect, must keep those traditional practices and beliefs which can be incorporated into the new society of the NWT.

This study is a unique chapter in the history of Northern Health. It is the most ambitious study undertaken to explore the lives of a cohort of children in the NWT. It has its flaws, yet it has revealed a wealth of important data. Studies of the sort described are rare, and it is the firm belief of the authors that this study is unique in terms of the amount and quality of the data collected for such a large population in spite of the logistical difficulties experienced in the Northwest Territories. It is unique also because a total population, as opposed to a sample, was studied and unique also because virtually all of the children in the two native groups, the Indian and Inuit, are unlikely to have moved from the NWT in the period between 1975 and the present.

The above factors make it more than merely an academic question to determine the fate of this cohort of children. The events which occur in infancy, and which have been well documented in the present study, have an effect which may be felt throughout life. It is the strong feeling of the authors of this report that it is necessary to re-examine as soon as possible the cohort which this study constitutes. This re-examination should include all those native infants who were enrolled in the original PIMMS study group. (While it is equally desirable to re-examine the White children who were in this cohort, they will be excluded because of the very high attrition of this subgroup due to movement out of the NWT.) This new cohort will number between 600 and 700 children between the ages of 6 and 8 years. Re-examination should consist of (a) a chart review--to determine those significant medical events which have occurred since the study ended; (b) a brief physical examination--including certain anthropometric measures; (c)possibly some laboratory investigations such as hemoglobin; and, (d) relevant sociological information.

The purpose of this re-examination is manifold. In part it will be a mini-survey of the health status of a known high-risk population group--native Canadian children. In part it will permit correlation of present health status with events which occurred in infancy; events such as: prematurity, birth jaundice, otitis media, meningitis, recurrent infections, poor growth, and mode of infant feeding.

There are few studies which present the opportunity given to us by this well documented cohort of infants, to look at child growth and health and to examine the consequences at a later age of events which occurred in infancy. It is for the above reasons that formal plans have been made to restudy this cohort. Hopefully, in two or three years time, a companion volume will document our new findings.

CHAPTER 1

INTRODUCTION AND METHODOLOGY

by D.W. Spady

INTRODUCTION

In 1970, the Infant Mortality Rate (IMR) in the Northwest Territories (NWT) was 65/1000 live births, a value nearly four times that of the rest of Canada. Among Inuit infants the IMR was 105, five times that of White infants and twice that of Indians. Endeavouring to determine reasons for the high mortality and morbidity rates in the Northwest Territories, it was proposed that a prospective birth cohort study be considered to investigate perinatal and infant mortality and morbidity for all children born in the Northwest Territories during a specified time period.

A committee was formed to design such a study and in time provided the nucleus of a decision making body, which was active throughout the life of the project. The composition of the committee included the regional director of Northern Medical Services and one or more of each of the following qualified persons: pediatrician, obstetrician, sociologist, pathologist, epidemiologist/biostatistician, midwife, and a management consultant as the special projects officer and co-ordinator. The type of investigation planned was a prospective observational survey of mortality and morbidity occurring during the first twelve months of life of a cohort of children born within a twelve month period. All health care contacts during pregnancy and infancy were to be recorded as were data regarding the nutritional habits and socio-economic environment of the infant and his family. In September, 1972 a proposal for such a study was approved by the Department of National Health and Welfare. Under the guidance of the regional director and the project officer, the Northwest Territories Perinatal and Infant Mortality and Morbidity Study - NWTPIMMS - was launched.

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the factors surrounding the high mortality and morbidity of infants in the Northwest Territories and to recommend possible action to improve the situation. The proposed objectives were to:

1. Identify the causes of death in stillbirths, neonatal deaths and infant deaths in the Northwest Territories.
2. Identify the nature and frequency of illness occurring during the first year of life.
3. Identify factors (socio-economic, nutritional, hereditary, or other) associated with infant mortality and morbidity.

4. Assess the adequacy of care and management of the infant and of the pregnant mother at home, in the nursing station or in the hospital, to determine whether patient care could be improved.

5. Recommend measures to prevent infant mortality and to reduce morbidity.

6. Identify areas for further investigation and research.

HYPOTHESES

The committee established a list of possible hypotheses warranting investigation. These were revised to include only those with a strong likelihood of supplying adequate data for analysis. These more important hypotheses included:

1. Pediatric mortality and morbidity increases with:
    a. poor socio-economic status;
    b. poor nutrition due to:
        1) bottle feeding in an unhygienic environment;
        2) lack of food supplements;
        3) lack of vitamins and iron;
    c. decreased availability of health care.
2. Poor obstetrical performance is related to:
    a. unavailability of health care;
    b. inability of the patient to understand and respond to appropriate health care procedures because of:
        1) poor educational achievement by the parents;
        2) language and other communication barriers;
        3) inadequate prenatal care;
        4) ethnic background;
    c. maternal medical complications:
        1) past medical history of renal disease, hypertension, diabetes, obesity, bronchiectasis, psychological problems;
        2) past obstetrical history and complications;

3) present obstetrical complications;

4) extremes of age (<16 years or >34 years).

3. Excessive consumption of alcohol increases death rates and all aspects of morbidity.

4. The perinatal mortality rate of the White population group in the Northwest Territories is similar to that in Canada as a whole (on the assumption that the stillbirth rate would remain the same, but because of distance and lack of neonatal intensive care units in northern Canada, there would be a slight increase in the first week death rate).

SOURCES OF DATA

TYPE OF RECORD

The vast bulk of the data was obtained from the normal nursing and medical records of the child. To facilitate the collection of data and to have it presented in a standard manner across the Territories, it was necessary to design and introduce five new record forms. The record forms were:

Prenatal Record

This was a ready summary of the mother's past obstetrical and medical history as well as a continuing record of the present pregnancy. The prenatal record was based on that used by the Alberta Perinatal Committee and, in a sense, had been pretested by its widespread provincial use.

Labour and Delivery Record

This was a summary of the events surrounding the labour and delivery of the child plus a capsule history of the mother's present and past obstetrical performance. This was a modification of the Labour and Delivery Record of the Royal Victoria Hospital, Montreal, and was not used in the Northwest Territories prior to this study, and therefore not pretested under field conditions.

Newborn Record

This summarized the events surrounding the infant's initial stay in hospital, and provided the admission and discharge examination findings as well as doctors orders and progress notes. Although not used regularly in the Northwest Territories previously, the form was recommended by the American Academy of Pediatrics and had received widespread use in Canada and the United States.

These three forms were adopted for continuing use in the Northwest Territories by the Department of National Health and

Welfare. Three others were designed specifically for use in this study. They were the:

Nutritional Background Questionnaire

This provided a summary of the infant's feeding history together with some information about the family nutritional patterns. This form was not pretested to any extent.

Sociological History of Child

This provided in-depth information about the social and economic factors shaping the environment of the child. An early version of this had earlier use, but it was not possible to pretest the final form prior to the onset of the study.

Autopsy Manual

An autopsy manual was also printed which outlined the general procedures for conducting an autopsy in remote areas.

Because these forms were introduced for this study and in some cases not pretested prior to use, careful attention was given to developing the forms to ensure they were easy to complete accurately.

All forms were reviewed by a team of systems analysts, form designers, and computer programmers to make certain that the information recorded would be suitable for coding and programming into a computer.

Other Forms

A number of other forms were used in the study. For the most part they had been in routine use for a number of years and their inclusion posed no problems. They include:

1. Apgar Scoring Sheet. 2. Personal Health Record. 3. Personal Immunization and T.B. Control Card. 4. Medical Services - Case History Sheet. 5. Medical Services - Progress Notes Sheet. 6. Medical Services - Treatment Record. 7. Medical Services - General Case History Summary. 8. Denver Developmental Screening Test. 9. Infant Boy's and Girl's Height and Weight Charts - based on studies of White children in Boston conducted by the Harvard School of Public Health. 10. Birth Certificates of the Northwest Territories and the Provinces of Canada. 11. Death Certificates of the Northwest Territories and the Provinces of Canada. 12. A small group of other miscellaneous forms.

Most of the above forms were completed by public health and community nurses in their day to day work. Where a child was seen by a physician it was necessary to obtain the relevant information from his office records. If a child was hospitalized, the hospital was asked for a summary of the child's stay in hospital. On occasion, information was obtained about an infant or his family from unusual sources, such as the R.C.M.P., or the local priest. For the sociological record, specially trained interviewers were employed in about half the cases to complete the interviews.

NURSE COORDINATOR

Due to the complexity of the study and the need for complete and organized records, a nurse coordinator provided orientation and instruction to doctors, nurses, and medical record librarians in each community. She was responsible also for supervising the collection of data and managing the day to day progress of the study. The nurse coordinator developed a manual of instruction outlining methods assuring accurate and full collection of data. She prepared audio-visual transparencies of forms and videotapes of pertinent test procedures to orient the field staff of the survey. Between October 1972 and April 1973, the nurse co-ordinator travelled 70000 km contacting and training those who would be involved in collecting the data. During these visits contact was made with the nurse-in-charge, the doctors, and the local health team. Where possible, this visit included the health aides and interested community leaders. To all she stressed the importance of the completeness of records, including home visits, attempted home visits, and the maintenance of complete treatment records.

Special emphasis was placed on obtaining autopsy consents, if at all possible, in all cases of death including stillbirths. In this matter the pathologist visited hospital centres in Inuvik and Yellowknife and outlined the desired autopsy protocol. Special arrangements were made with air carriers for the delivery and return of the bodies of those autopsies performed in Southern centres.

COLLECTION OF DATA

Initially planned to begin on January 1, 1973, the study was postponed as it was impossible to orient all the field staff by that date; instead the study was carried out between the dates of April 1, 1973 and March 31, 1974.

A large proportion of the field personnel sent in data regarding deliveries between January 1, 1973 and March 31, 1973. This became a pilot project pretesting the data collection system in the field, and allowed the remedy of some difficulties arising in implementing the study design. This pre-project activity was only a limited operation.

All the information from the field was sent to a central study office in Edmonton. Upon receipt there, each new case had all records examined for completeness of detail and accuracy of entry. Those deficient, missing information, or improperly prepared, were returned to the originator for completion or clarification. The office staff maintained a check list which established all the records normally expected for each case.

To permit easier handling of the data, the study was divided into calendar quarters and also into area zones. The cases were then entered according to zone, quarter, name and medicare number. The medicare number was an important link as it facilitated tracing patient-doctor contacts through the computer data bank of the Territorial Hospital Insurance Service. All study patients were identified in this manner.

All private doctor-patient contacts outside of the Northern Medical Services system were identified via the Territorial Health Insurance System. Subsequently the doctors' files were examined for each contact to obtain the diagnosis and all other necessary information.

SEQUENCE OF DATA COLLECTION

The research protocol called for those records dealing with the pregnancy and parturition to be sent to Edmonton within two to three weeks of delivery. The Denver Developmental Screening Test (DDST), the nutritional record and the child's hemoglobin were to be supplied at six and twelve months of age. During the first year of life, a sociological interview was to be completed and the information recorded on the sociological questionnaire.

On the infant's first birthday, all records not already forwarded were photocopied and mailed to the study office. This included the immunization record, treatment records, progress notes, growth charts, and any admission and discharge summaries.

In the event of a stillbirth or an infant death, as much as possible of the above information was searched out, collected and forwarded to the study office. In addition, permission for an autopsy was to be obtained if at all possible, with the clear understanding that the body would be returned to the settlement for burial. A copy of all autopsy findings was forwarded to the NWTPIMMS office for inclusion in the record.

The above outlined the original proposed procedure. It was to be expected that, in such a complex study, plans could not always be followed in their entirety and a number of problems became apparent.

PROBLEMS IN THE COLLECTION OF THE DATA

Many difficulties were encountered in the collection of the data for this study, some were related to the data collection itself, and others to the environment of the Territories. The major complication was communication. On the "macro" level this involved mechanical types of trouble such as transportation, radio and telephone transmission and mail service; at the "micro" level it involved interpersonal and cross-cultural communication.

The distances and the climate of the North made transportation both difficult and unpredictable, with the possibility that personnel, records, or materials could be stranded in a settlement for weeks.

The vagaries of the Arctic geography and climate also made radio and telephone transmission uncertain during the time the study was conducted. The mail strikes of 1974 and 1975 slowed delivery of records to the study offices, and led to the loss of a small percentage of the data; this necessitated resubmission by the settlement nurses.

Cultural values and practices presented certain problems in communication and data collection. An example was the difficulty of obtaining complete and accurate medical and obstetrical histories from Native women. Another illustration was the ease with which the Inuit and indian peoples gave up and adopted children. Such actions led to one child having more than one name and many times involved more than one spelling of those names. Compounding this, each name might have its own medicare number. This misidentification of children made it necessary to devise a very tight identification control system which depended on information from independent sources.

Language was a problem when providing health care and obtaining accurate information from Native parents in a community. Sometimes information was secured through an interpreter who did not necessarily provide literal translation of what was said.

The birth and death certificates available were not always completed accurately or filed promptly. This problem was lessened as the hospitals and nurses in the Territories supplied the study centre with the medical records relating to birth or death shortly after the event occurred.

Another difficulty in collecting data was the mobility of the population being studied. Most commonly this affected the White population, as it moved freely in and out of the Northwest Territories. With the Native peoples there was also mobility, but usually only between settlements or districts within the Northwest Territories. The mobility problem was offset by the fact that the major part of the populace was "captive" in the sense that all the health records were readily available. The access to all nursing station records, and the majority of doctor and hospital records, supplied the information on essentially all the professional health care of these people. While mobility in many projects was taken as a matter of course, in this study with our "captive" population, the problem was greatly reduced. Although mobility could not be controlled, the wanted data showed on the records available and therefore could be taken into account during the data analysis.

Accurate data collection depends upon standardized techniques and trained staff. With the turnover of the field personnel throughout the study, maintenance of consistent collection techniques presented a continuing challenge. To circumvent such situations each new nurse, prior to going to the Territories, was oriented as to the purpose, plan, methods and techniques of the study. Throughout the study the nurse co-ordinator visited all the nursing stations periodically and restated the procedures of data collection with the nurses. It was interesting to note that, even with the turnover of nursing staff, the committee found the reporting from the nursing stations as good as or better than that received from hospitals or doctors' offices.

The all important Sociological questionnaire was a problem unto itself. This was due to the personal and confidential nature of the questions and in part to the other problems mentioned above. The sociological data were obtained in a variety of ways, with most collected by specially trained interviewers who went into a community and obtained information directly from the family concerned plus the local nurse, R.C.M.P., or priest. Community nurses and health workers were responsible for the next largest proportion of data. Because a large number of Whites moved out of the Territories, it was necessary to contact them by mail asking that they complete the questionnaire. Of the 141 so affected, 98 were contacted and 60 responded - one family from as far away as Africa! The mail strike of fall 1975 undoubtedly was a negative influence on the number of returns which were received.

Another aspect of the sociological data was that while the questionnaire was supposed to have been completed within the first 12 months of the child's life, in many cases it was not finished till well after the first birthday. This was circumvented by asking the families to respond in terms of their circumstances during the child's first year of life rather than to their circumstances at the time of the completion of the questionnaire.

DATA MANAGEMENT

To accept and edit the vast amount of data collected, a CCISS (Conversational Computer Information and Statistical System) program was used to prepare an edited data file in a form readily managed by computer. The CCISS program was specifically designed for the organization, editing and statistical processing of complex health sciences data.

To establish the master data set it was necessary to design individual records for each major type of information obtained. This study had 20 Record Types with each made up of from 6 to 45 individual variables. In the building of the data file it was necessary to convert all information into a numeric code which would permit easier management of the data. With this technique, it was possible to extract specific information from each case and insert it in numerical form on an encoding sheet. For the actual tedious, meticulous process of encoding, the committee employed a medical record librarian and a nurse midwife. Over a period of one year they performed the entire encoding process, assuring a consistency not possible in any other way.

All the data of a case (1 subject) were entered on an individual encoding form. About 30 forms made a batch and when three or four batches were completed they were sent to the computing centre for keypunching, editing and transcription to a master tape. A total of 35 Boolean expressions were created to detect inconsistencies and errors in coding. When an error was detected, the pertinent information was checked and the error corrected. The percentage of errors detected was less than one percent and was due to the conscientious and consistent work of the two encoders.

The coding operation was verified by a double coding system where a third encoder re-entered by random selection, five percent of the sample. These recoded sheets, checked against the initial coding for inconsistencies, showed an error rate of 0.88 percent.

Upon completion of the encoding and editing process, the master data file was then analyzed using the Statistical Package for the Social Sciences (Nie et al, 1975).

DATA ANALYSIS

The techniques used in the analysis of the data varied considerably with the subject matter of the chapters, therefore, specific details can be found in the relevant sections of the report. However, due to certain relatively unique characteristics of the data set, some general comments are necessary.

The statistical analysis of most surveys is based on the premise that only a portion, or sample, of the total population is being investigated and inferential statistical techniques are used to relate the findings in the sample to the whole population. The present study is different in that all the infants born during a one year period were studied; where data are missing it is due to factors beyond the control of the investigators. The conclusions drawn regarding the factors influencing the health of the infants during their first year of life are based on observations made on the entire population of infants; no sampling was used.

If the data set is to be considered as a sample it has certain flaws. The most important flaw is that it represents only a point in time--the years 1973-1975; extrapolations beyond this time frame are possible but there is no guarantee that the factors acting in 1973-1975 to influence health continued to act beyond this time. However, it is the candid opinion of the authors that most of the influencing factors have not changed significantly.

A second important consideration in extrapolating beyond the data set is that the uncertainty, which exists in the present data set, is due not to sampling error but rather to non-response, measurement error and bias which can not be evaluated by statistical inference.

Notwithstanding the above comments, the reader will note that in various parts of the text inferential statistics are employed. A main reason for this is that some readers will want to extend the findings of this study and generalize over a longer period of time. For these readers, the inferential models have been utilized, but should be used only with the recognition that the data set constitutes a cluster sample taken over a short period of time. For those readers who feel that there is not an adequate basis to treat the data set as a sample, the results are presented descriptively. In either case, the differences observed between various groups and variables are real; they did not occur by chance. The significance of these differences, in biological or sociological terms, is harder to determine and will be discussed in the appropriate sections of this report.

CRITICISM OF THE STUDY METHODS

Where possible, and deemed reasonable, the deficiencies or limitations of a particular type of data will be discussed within the particular section of the report concerned with that information. Hopefully this will allow a more objective judgement of the quality of the relevant data being analyzed. There are, however, certain general comments which may be discussed at this point. The major criticisms which could be directed to this study are concerned with:

The Sources and the Collection of Data

Data had been collected from a variety of individuals, in a variety of ways, by individuals with differing degrees of education, interest, and expertise and who may not have been trained in the use of the specific techniques employed in this study. This naturally led to concern about the quality of data.

The Accuracy of the Reported Events

This was most evident in those sections dependent on obtaining an accurate history from an individual who was not inclined or able to communicate clearly with the investigator. This was felt to be an important factor in the data describing maternal history, previous obstetrical history, and the sociological information.

Inaccurate data for the maternal history and previous obstetrical history, while of much concern, did not affect the basic results of this study. However, the inability to assess accurately the sociological variables was more serious, and the interpretation of the more subjective aspects of the questionnaire should be tempered with caution.

The Accuracy of Physical Measurement Data

Data such as heights, weights, blood pressures, etc., were somewhat in question as they were recorded by health personnel under non-standardized conditions with varying types of equipment. This makes precise comparison between individuals questionable. However, most biological and anthropometric measurements were made under semi-standard conditions with semi-standard techniques. Therefore comparisons between individuals were possible if the differences to be detected were of sufficient magnitude. Thus, a child falling on the third percentile for weight was likely to be significantly smaller than a child of the same age and sex who falls on the fiftieth percentile for weight, even though the techniques and instruments used for measurement were not identical.

Obscurities in the Questionnaire

This led to inaccuracies in the data. In certain instances it became apparent that the questionnaire (or survey sheet) contained questions which were difficult or impossible to answer. This was evident in the nutrition questionnaire, where a question regarding the measurement of the consumption of sweets per week by the family was impossible to answer accurately. Where it was apparent that a question was answered consistently in an ambiguous or inaccurate manner, that particular question was eliminated from further analysis.

The Applicability of Certain of the Instruments

Certain of the measurement instruments employed in this study may have been inappropriate for the population under study. A prime example is the assessment of infant development using the Denver Developmental Screening Test - a test designed for a population group with different cultural and developmental norms, and therefore of value in this study only when making gross assumptions about the development of native children.

Defects in the Study Design

A number of defects became apparent as the study progressed. Some of these were:

1. Pretesting of survey forms was done to a certain extent early in the study; however, constraints of time and resources prevented more complete pretesting. Certain forms, those of the DDST and the Nutrition questionnaire were not pretested for this study. The Sociological Questionnaire was pretested to some degree in an unofficial pilot study, but the

subsequent modifications were not pretested prior to this study. More complete pretesting would have picked up numerous small problems that cropped up later and which made data analysis more difficult.

2. No allowance was made for a pilot study to precede the main study. This prevented the detection of errors in the technique of filling out forms and in the integrity of data.

3. The frequent necessity of using an interpreter to complete the questionnaires made it impossible to determine if the interpreted questions and answers were understood and given correctly.

4. In some instances, because of the private nature of some of the questions, the responder may have been unwilling to give a complete or correct answer.

5. Complete records were obtained in only 41 percent of cases. This does NOT mean that the data for the other 59 percent of cases is invalid, it means only that a totally complete report of all the requested information was not obtained. In most cases the records are incomplete to only a very minor degree and serious loss of data occurred in only a very few cases. In the case of children of White parents, the major source of incomplete records was their movement out of the NWT during the study year.

6. The exact criteria describing a specific disease state were not defined. This has made it difficult to analyze accurately the nature and frequency of morbidity and may have tended to bias the analysis (See Chapter 8).

COMMENT

While the deficiencies outlined above and in the body of the report do weaken the validity of the final document, these limitations are common to this kind of research and they do not detract from its considerable strength. Perhaps the greatest strength is that the population studied is a "captive" health population, one that permits ready access to all nursing, medical, and hospital records possible. The report provides information in near totality on almost all medical problems experienced by this population and the medical care it received. Secondly, the "population" studied is in reality three different populations - two Native populations, Inuit and Indian, with varying degrees of acculturation and one "control" population - the White, who had a way of life in the North not that far removed from Southern living standards. Thus, this study provides a rich source of unique comparative data describing the medical, social, obstetric, and nutritional environment of a population in transition. Information to this degree of completeness has never been collected in Canada before and, to the author's knowledge, is rare anywhere else in the world.

CHAPTER 2

THE SETTING OF THE STUDY--THE NORTHWEST TERRITORIES

by C.W. Hobart, O. Schaefer, F.H. Silversides

INTRODUCTION

In the Spring of 1973 when this study was launched, the Northwest Territories was no longer the home of a widely scattered and isolated population, rather it was a land in change; change from an isolated traditional mode of living to the hustle and bustle of a land "on the move". Mining and mineral exploration throughout the Territories, the influx of Whites, plus an expanding Government influence, had a massive impact. In the southwestern corner of the Territories hamlets were growing into towns and some towns were beginning to look like small cities. Yellowknife, the Territorial capital, had about 8000 permanent residents; Hay River, the shipping point upstream on the Mackenzie River, had a population of over 3000; and Inuvik on the Mackenzie Delta at the other end of the shipping lane, claimed a similar number. Part of the year these small bustling centres were so swollen with transients that they seemed much larger.

With the clustering of people into settlements and the linking of these communities together by frequent and regularly scheduled airline flights, the isolation of the Northern resident had largely disappeared. Days when people looked forward to one or two charter flights in the Winter and Spring, and to "ship time" in the Fall, were gone for most of the Territories. It was a rare populated area that did not have at least one scheduled flight a week; the few that saw a scheduled flight once a fortnight or less usually had many other flights chartered by the various branches of the Territorial or Federal Government, by commercial or research interests, and in some localities by natives bringing liquor into the community.

These changes, although of immense impact on every aspect of native life, left the land itself largely unchanged. It was still a vast subcontinent of ice and snow, taiga, lakes, and tundra.

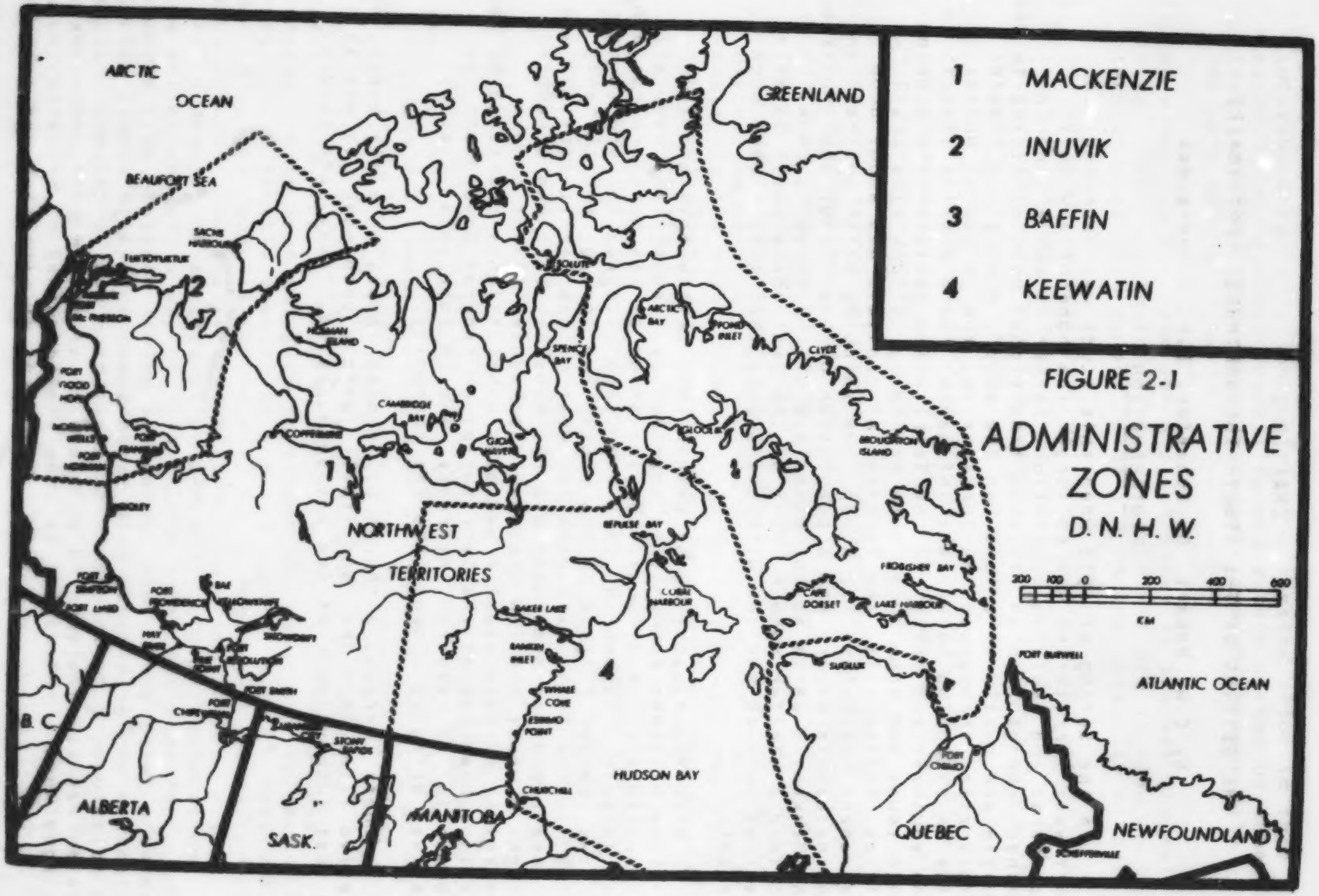
1 MACKENZIE
2 INUVIK
3 BAFFIN
4 KEEWATIN
ARCTIC OCEAN
BEAUFORT SEA
GREENLAND
SACHS HARBOUR
TUKTOYAKTUK
FORT McPHERSON
FORT GOOD HOPE
NORMAN WELLS
FORT FRANKLIN
FORT NORMAN
WRIGLEY
FORT SIMPSON
FORT LIARD
FORT PROVIDENCE
RAE
YELLOWKNIFE
SNOWDRIFT
HAY RIVER
PINE POINT
FORT RESOLUTION
FORT SMITH
FORT CHIPEWYAN
URANIUM CITY
STONY RAPIDS
HOLMAN ISLAND
COPPERMINE
CAMBRIDGE BAY
GJOA HAVEN
RESOLUTE
SPENCE BAY
ARCTIC BAY
POND INLET
CLYDE
IGLOOLIK
BROUGHTON ISLAND
REPULSE BAY
CORAL HARBOUR
BAKER LAKE
RANKIN INLET
WHALE COVE
ESKIMO POINT
CHURCHILL
FROBISHER BAY
CAPE DORSET
LAKE HARBOUR
SUGLUK
FORT BURWELL
FORT CHIMO
SCHEFFERVILLE
NORTHWEST TERRITORIES
HUDSON BAY
ATLANTIC OCEAN
QUEBEC
NEWFOUNDLAND
MANITOBA
SASK.
ALBERTA
B.C.
1
2
3
4
200 100 0 200 400 600
KM

FIGURE 2-1

ADMINISTRATIVE ZONES
D. N. H. W.

THE NORTHWEST TERRITORIES

GEOGRAPHY

The Northwest Territories is the largest, most northerly and most sparsely populated political jurisdiction in Canada (Figure 2-1). With a lateral extension ranging from approximately 60 to 140 degrees West longitude, and a vertical extension from 60 to 84 degrees North latitude, it covers more than one third the area of all of Canada, yet it includes less than one half of one percent of the the total population of Canada. It is sub-divided by Northern Medical Services into four administrative zones: Baffin, Inuvik, Mackenzie and Keewatin. This subdivision is illustrated in Figure 2-1.

This is an area characterized by rather wide geographical extremes. The tree line crosses the western part from the Mackenzie Delta in a southeasterly direction. The area south and west of this is forested, while the region north and east is treeless tundra. The Western portion of the Territories is a continuation of the Great Central Plain of North America and is generally flat, while that area to the East is mainly made up of the Canadian Shield.

CLIMATE

The climate reflects similar diversity, although the mean values reported tend to mask the more dramatic extremes. The warmest areas are in the South of the Northwest Territories and in the Mackenzie Delta. Thus, in Fort Smith, next to the Alberta border at the 60th parallel, the mean July temperature is 16°C and the mean January temperature is -10°C. Aklavik, above the 68th parallel in the Mackenzie Delta, is similar though cooler with mean July and January temperatures of 14°C and -29.3°C respectively.

The coldest areas are in the high Arctic. In Resolute Bay the mean July temperature is only 4.4°C and the mean January temperature is -32°C. Communities in the south and next to large bodies of water, like Yellowknife on the shore of Great Slave Lake, may experience as many as 113 frost free days per year; however, Fort Smith, 360 km farther south, and away from this lake, averages only 59 frost free days. North of the Arctic Circle, the 24 hours of daylight in summer ensures a substantial number of frost free days in these regions but the average daily temperatures are not very high; thus Coppermine has an average of 53 frost free days per year, quite similar to Fort Smith mentioned above.

The Southern part of the Territories tends to have lower wind velocities and higher precipitation rates, while the barren lands are characterized by the reverse pattern. For example Fort

Smith has a mean annual wind velocity of 10.5 kph and Cambridge Bay on the south coast of Victoria Island (69th parallel) has a wind velocity averaging 22 kph with only 28 cm of precipitation per year.

THE COMMUNITIES OF THE NORTHWEST TERRITORIES

There are many criteria under which the 59 towns and settlements in the Northwest Terrritories might be grouped for summary discussion: size, ethnic composition, facility of communication with the South and geographical considerations are only some examples.

For this description, communities in the Territories are broadly divided into Mackenzie Basin communities and Arctic communities, with each of these regions further sub-divided. The reasons are geographic, historic, and ethnic. The Mackenzie Basin is below the treeline while the Arctic zone is above it; the Mackenzie Basin generally has had earlier and greater continuity of contact with Euro-Canadian culture than has the Arctic zone; and finally, in terms of aboriginal residents, the Mackenzie Basin communities are Indian, while the aboriginal residents of the Arctic are the Inuit. The interface of these two ethnic groups is in the Mackenzie Delta, specifically at the communities of Aklavik and Inuvik. The south end is Indian and the north end Inuit.

This ethnic division does not result in a change of any governmental administrative zones. The map (Figure 2-2) illustrates these differences more clearly.

THE MACKENZIE BASIN

The communities of the Mackenzie Basin can be divided into three sections: the communities of the Upper Mackenzie and Great Slave Lake area, those of the Middle Mackenzie, and those of the Mackenzie Delta.

The Upper Mackenzie and Great Slave Lake Region

This region starts in the South and West at the boundaries of Alberta, British Columbia, and Yukon Territory. To the East it is limited by the treeline, with the only arbitrary boundary the northern one, which was drawn to include Rae-Edzo (together with its satellite community of Lac la Martre), and Fort Simpson. At the time of the study these communities were the northern limits of the highway system in the Territories. This was seen as a significant basis for demarcation because in all of the major settlements of this zone highway-borne influences penetrated easily from the South. North of this region, movement in and out of the communities from the South was restricted to air travel which imposed a significant filtering process.

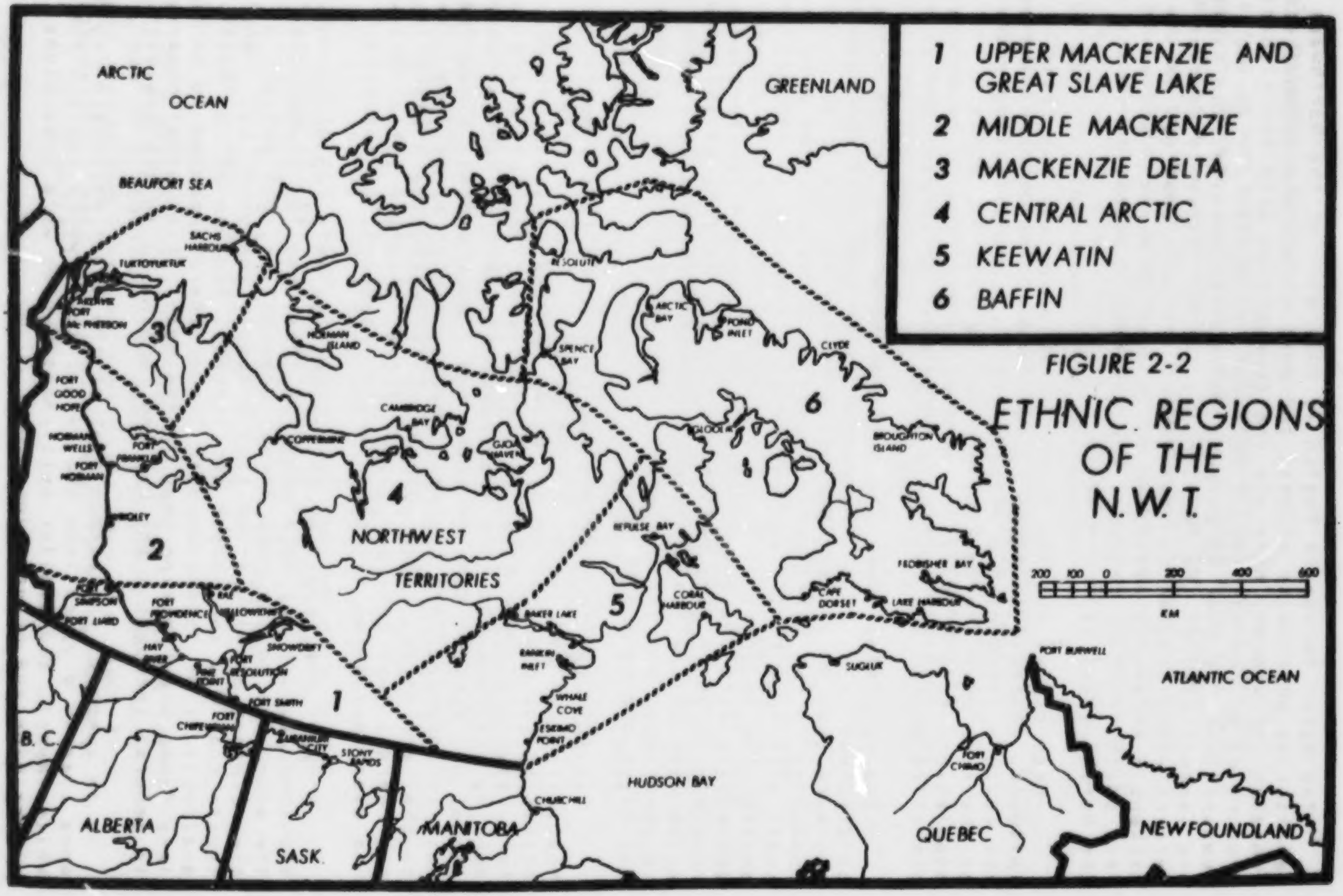
1 UPPER MACKENZIE AND GREAT SLAVE LAKE
2 MIDDLE MACKENZIE
3 MACKENZIE DELTA
4 CENTRAL ARCTIC
5 KEEWATIN
6 BAFFIN
ARCTIC OCEAN
BEAUFORT SEA
GREENLAND
SACHS HARBOUR
TUKTOYAKTUK
AKLAVIK
FORT McPHERSON
FORT GOOD HOPE
NORMAN WELLS
FORT NORMAN
FORT FRANKLIN
WRIGLEY
FORT SIMPSON
FORT LIARD
FORT PROVIDENCE
RAE
YELLOWKNIFE
HAY RIVER
PINE POINT
FORT RESOLUTION
SNOWDRIFT
FORT SMITH
FORT CHIPEWYAN
URANIUM CITY
STONY RAPIDS
HOLMAN ISLAND
COPPERMINE
CAMBRIDGE BAY
GJOA HAVEN
RESOLUTE
SPENCE BAY
ARCTIC BAY
POND INLET
CLYDE
BROUGHTON ISLAND
IGLOOLIK
REPULSE BAY
CORAL HARBOUR
BAKER LAKE
RANKIN INLET
WHALE COVE
ESKIMO POINT
CHURCHILL
FROBISHER BAY
CAPE DORSET
LAKE HARBOUR
SUGLUK
FORT BURWELL
FORT CHIMO
NORTHWEST TERRITORIES
HUDSON BAY
ATLANTIC OCEAN
QUEBEC
NEWFOUNDLAND
MANITOBA
SASK.
ALBERTA
B.C.
200 100 0 200 400 600
KM

FIGURE 2-2
ETHNIC REGIONS OF THE N.W.T.

The Upper Mackenzie Region is that part of the Northwest Territories physically closest and most accessible to southern Canadian influences. Here are the communities with the highest proportion of non-natives. Pine Point, essentially a mining company town, is over 90 percent White. Yellowknife, the capital and largest city of the Territories, is estimated to be over 85 percent White population. Hay River, the port upstream on the Mackenzie River, is estimated to be over 75 percent White. In Fort Smith, in many respects the Government education centre of the North, about half are White.

These cities set the "tone" of this region, but their influence extended to other lesser communities which reflected the cultural encounter process: Fort Simpson, effectively the end of the road down the Mackenzie River, a majority White population; Fort Providence, on Great Slave Lake, with more than one third White; and Fort Resolution over 60 percent White.

The remaining towns and settlements of this region tended to be distinctively Indian in make-up. With over 1000 inhabitants, and more than 90 percent Native, Rae-Edzo was the largest Indian community in the Territories. Most Indian communities were very small with only Fort Liard and Snowdrift having as many as 250 people. The majority of these places did not have a highway connection with the South. These small communities represented a crucible in which were melded the old way of life of the bush, which many of the residents were involved in no more than 10 or 15 years ago, and the new way of life exemplified by Yellowknife, Hay River and Fort Simpson.

Yellowknife, Fort Smith, Hay River, and Fort Simpson had hospitals; all had liquor stores as well. Pine Point had ready access to the hospital at Hay River. Of the remainder, Snowdrift, Fort Resolution, Rae-Edzo, Fort Providence, and Fort Liard had nursing stations and Fort Providence had several lounges where liquor was served. None of these had liquor stores. Liquor was readily imported into the settlements, either by mailing orders to the Territorial Liquor Stores or by chartering a plane into the nearest town having a liquor store. When the latter procedure was used very large shipments would frequently be imported.

None of the remaining settlements in this region had nursing stations. Liquor was obtainable in these smaller communities in the same ways as the next larger communities, but because of their lesser acculturation they probably consumed less liquor per capita than did the larger settlements. Because of the easier availability of "store-bought" liquor there appeared to be much less "home brew" making than in the past. This latter observation is general throughout the NWT and remains so to the present day.

In summary, the communities of the Upper Mackenzie region were clearly divided into the larger towns which reflect the White impact, and smaller settlements which were traditional in composition and orientation.

The Middle Mackenzie Region

This region was made up of six communities: Wrigley, Fort Franklin, Fort Norman, Colville Lake, Fort Good Hope and Norman Wells. The first five were similar to the smaller Indian communities of the Upper Mackenzie Region but larger in size, ranging from 250 to 400 people. Colville Lake was the only community lacking regular air connections; however, planes were readily chartered. It also lacked a nursing station, a facility enjoyed by all the other communities mentioned.

Norman Wells stood apart from the other communities by being predominantly White company founded and operated (Imperial Oil). The town had a liquor outlet and also enjoyed the benefits of daily jet service to Inuvik and Yellowknife; however, its influence in the region was limited by the competition of the larger towns to the south and Inuvik to the north.

Mackenzie Delta

There were only five communities on the Mackenzie Delta proper: Arctic Red River, Fort McPherson, Aklavik, Inuvik, and Tuktoyaktuk. To these should be added Sachs Harbour on Banks Island, and Paulatuk, about 129 km east along the coast, as they were a part of the hinterland of Inuvik and the people in these two settlements had close kinship with the Inuit people of the Delta.

The Delta was an "interface" zone and very well could have been called the melting pot of the Territories. Here Indian, Inuit, and Euro-Canadian influences and individuals met and intermingled as they have done for almost a century. This contact was more restricted in Inuvik which, because of the differences in the housing and utilities, was more segregated than any of the other Delta communities.

The communities of this region fell clearly into three clusters. Inuvik and Aklavik had the most heterogeneous population of any in this region. The dominating centre was Inuvik. In 1971 Inuvik had a population of about 3000 which by 1974 had jumped to over 4000; the increase was due to a large influx of transients. Nearly 70 percent of the population was White, 15 to 20 percent Inuit, less than 10 percent Indian and the remainder Metis. In Aklavik the population was made up of Inuit 42 percent, White 22 percent, Indian 21 percent, and Metis 15 percent.

The second element included two Indian settlements: Fort McPherson, having a population of about 850 during the study period, and Arctic Red River with slightly less than 100. Both were predominantly treaty Indian with relatively few Metis and no more than 10 or 12 percent White.

The third group of settlements included Tuktoyaktuk with about 680, Sachs Harbour with a population of about 140, and Paulatuk having almost 100. These were all predominantly Inuit settlements with less than 10 percent White residents.

In 1972 -1974 there was a 100 bed hospital in Inuvik while Fort McPherson, Aklavik, and Tuktoyaktuk had nursing stations. Arctic Red River, Sachs Harbour, and Paulatuk, being too small to have nursing stations had health stations stocked with adequate supplies of drugs and staffed by trained lay dispensers. These settlements were in radio contact with Inuvik, so that medical advice could be received over radio-telephone and a medical evacuation arranged in event of a medical emergency.

Inuvik had a Territorial Liquor Store and in Fort McPherson beer had been sold through the Hudsons Bay Store since 1972. The proximity of the communities located on the Delta to Inuvik made liquor from this source readily accessible throughout the year. One consequence of the general affluence which the oil exploration boom had brought to this area was the flights to purchase liquor in Inuvik, which were chartered with surprising frequency by the Native people in this area.

THE ARCTIC REGION

The Arctic Region was divided into three zones: the Central Arctic, the Keewatin, and the Baffin.

Central Arctic

All the settlements in the Central Arctic were primarily populated by Inuit. The two largest were Coppermine having a population of about 730, and Cambridge Bay on Victoria Island, with about 670 residents during the study period. Cambridge Bay was the dominant "centre" of the area, with jet flights to and from the South two or three times a week. From Cambridge Bay small Twin Otter flights fanned out to Holman Island, Gjoa Haven, Spence Bay, and Pelly Bay. At various times during the 1972 - 1975 study period Coppermine had between two and four Twin Otter or DC-3 flights to and from Yellowknife each week.

Cambridge Bay was the only settlement in this zone with a doctor during the study period. He was located at the Nursing Station and had only the usual nursing station equipment and personnel at his disposal. Coppermine, Holman Island, Gjoa Haven, Pelly Bay, and Spence Bay had the regular nursing stations staffed by one or two nurses.

Beer, available from the Hudsons Bay Company in Cambridge Bay, was the only alcoholic beverage to be purchased locally in this zone. People in Coppermine and Cambridge Bay ordered in liquor from the Territorial Liquor Store at Yellowknife. The orders from Coppermine for January through December 1973 totalled about $14800.00 (personal communication, C. Hobart). These reflected both the relative sophistication of the people and the rather easy availability of wage employment in these two communities. The other four settlements in the zone were quite "dry" and only Spence Bay showed signs of a growing interest in alcohol.

The settlements of Coppermine, Holman Island, and Pelly Bay were favourably located so far as caribou, fish, seal and white fox resources were concerned. Unfortunately, the same could not be said of the other three settlements, with Gjoa Haven being particularly poorly situated. The result was that while welfare clients were uncommon in the first three they were much more numerous in both Cambridge Bay and Spence Bay, and comprised a very large majority of those living in Gjoa Haven during certain seasons of the year.

In addition to the places described above there were two other locations in this zone where numbers of families had spent most of the year during one or more years of the study period although neither could be described as a permanent settlement. Bathhurst Inlet is a deep inlet cutting into the Arctic coast extending to a distance of 322 km south-south west of Cambridge Bay. A number of people had hunting camps scattered along the coast of this inlet and the Roman Catholic Church operated an informal trading post at Bay Chimo toward the mouth of the inlet to make supplies available to people over-wintering there during some years. Some reasons for the relative popularity of Bathurst Inlet were that it was a good area for meat, fish, and fur and the life style contrasted with Cambridge Bay, which was widely perceived as a rather disorganized settlement characterized by much drinking and violence.

The Keewatin

The Keewatin includes the five communities of Eskimo Point, Rankin Inlet, Whale Cove, Chesterfield Inlet, and Repulse Bay along the West coast of Hudson Bay together with Coral Harbour on Southhampton Island, and Baker Lake in the barren lands. All of these communities in the Keewatin had nursing stations, but only Rankin Inlet provided any alcoholic beverage. The residents in all of these Keewatin settlements, as well as in all but two of the Baffin settlements, were overwhelmingly Inuit.

The earliest centre of dominance of the Keewatin region was that of Chesterfield Inlet. At one time it was a major centre of Roman Catholic activity with a residential school and an active treatment hospital, but in the early 1960's these institutions were closed.

Rankin Inlet, a mining centre in the 1950's has increasingly been made the main administrative centre. It has attracted most of the Inuit population, and some administrative functions from nearby Chesterfield Inlet and Churchill in Northern Manitoba. With a population of almost 600, Rankin Inlet was exceeded in size by both Baker Lake, with about 800, and Eskimo Point which had a population of about 700. The Manitoba harbour of Churchill, at the end of a rail line from the South, was and still is the supply centre by ship in summer and by regular air traffic year round. Here also is the nearest hospital for Keewatin patients.

Three communities: Eskimo Point, Whale Cove, and Rankin Inlet had received refugees resettled after starvation afflicted the barren lands Inuit during the later 1950's. Between 1958 and 1962 the population of Rankin Inlet was also increased due to mining activities. At the time of the study all were overcrowded communities with poor meat and fur resources, which resulted in large portions of the inhabitants of each being on welfare for much of the year. Eskimo Point did not even have an adequate fresh water supply, and its site was often marshy during the summer. Repulse Bay and Coral Harbour were smaller and more fortunately located so far as local resources were concerned, and consequently the welfare case load in these two settlements was distinctly lighter. Chesterfield Inlet, at one time a major centre of Roman Catholic activity with a hospital and residential school, since 1959 had lost its pre-eminence and some of its population to Rankin Inlet.

The Baffin Region

This was the largest of the regions considered, approaching in size the area of all the other regions combined. For convenience it can be divided into the Lower Baffin and the High Baffin.

The Lower Baffin included all five of the settlements at the South end of Baffin Island, Sanikiluaq on the Belcher Islands and Port Burwell at the mouth of the Hudson Strait.

Clyde River on the East coast of Baffin Island and Hall Beach and Igloolik on the East coast of the Melville Penninsula, although served by plane connection directly from Frobisher Bay, more closely resemble the High Baffin where they also have strong kinship ties.

The dominant centre of Lower Baffin was Frobisher Bay, having about 2200 persons at the beginning of the study period, together with the only hospital and liquor store in the whole of the Baffin region. Jet planes from the South landed here several times a week, and scheduled small plane flights covered all of the smaller settlements in the Lower Baffin with the exception of Sanikiluaq and Port Burwell.

Next to Frobisher Bay, the largest settlements in the Lower Baffin were Pangnirtung, Cape Dorset, and Igloolik on the Melville Peninsula, with about 600 - 700 inhabitants each. All others had between 250 and 300 residents with the exception of Port Burwell, which had about 130 people.

Most settlements were reasonably located with good local resources, and a number had augmented their incomes substantially by lithography, stone carving, and craft production. The prints from Cape Dorset and the carvings from Dorset and Pangnirtung, as well as other Lower Baffin locations, were in particular demand.

Liquor was available only in Frobisher Bay but could be ordered in by other settlements. Alcohol consumption was not uncommon in most of the larger settlements of this area but, with the exception of Cape Dorset, it did not appear to pose as great a problem as that encountered in Frobisher Bay, Inuvik, or Cambridge Bay. (The liquor store in Frobisher Bay was closed in 1976, and liquor poses much less of a problem than in 1973.)

Resolute Bay was the transportation centre of the High Baffin, serving the Inuit settlements of Grise Fjord, Pond Inlet, and Arctic Bay, as well as a number of oil companies' base camps and drilling sites. It is unique among the several Arctic centres, in that it received several jet flights from Edmonton in Western Canada and from Montreal in Eastern Canada. Its small planes flew on a semi-scheduled basis to Igloolik and Hall Beach as well as to the three settlements mentioned above. There was no hospital at Resolute Bay, but in keeping with the other communities in the High Baffin, it had a nursing station. Liquor was available in the bar at the hotel in Resolute Bay, but orders for shipments into other communities could be placed only with the Territorial Liquor Stores. Modest sized orders were regularly received from Pond Inlet and Arctic Bay since the men from these communities had been regularly employed as casual labourers by Panarctic Oils Ltd. in the oil exploration activities of the High Arctic.

LIVING PROBLEMS IN THE NORTHWEST TERRITORIES

The size, the isolation, the widely spread but sparse population, the geography, and the extreme weather conditions characteristic of the NWT made life and health maintenance there very difficult. The basic health needs were those of good shelter, the accessibility of reasonably priced food, and the availability of water and sewage systems. Adequate housing, supportive of healthy living habits, was a major problem, especially for Natives. Over-crowding, poor construction and lack of the amenities resulted in the spread of infection, lack of cleanliness and mental strain. The lack of dependable communication and transportation often exacerbated these problems.

The unreliability of transport to and from the more isolated communities caused problems of access by patients to medical personnel, hospitals and other health facilites. For these reasons, small self-dependent health establishments were necessary in most communities regardless of cost. Transport of people and the necessities of life, such as adequate and proper foodstuffs, were dependent in most communities upon the airplane and the short annual use of water transport. The first incurred high cost and the need for a fairly sophisticated technology; the second was dependent on weather and was available only during the short, warm, periods of summer. Transport of people to and from the necessary facilities, such as schools and hospitals was also a high cost item and automatically restricted free movement.

There were problems connected with the lack of access to sufficient and potable water supplies. Many parts of the North are semi-arid; the resulting lack of suitable water caused little difficulty to a nomadic life style, but the development of permanent settlements greatly intensified this situation.

Closely related to potable water was the matter of sewage disposal. In many parts of the North the "honey bag" was the typical means of disposing of raw sewage. Consequently there were the difficulties of poor sanitation procedures due to the lack of facilites and knowledge.

Many of the problems of life in the North were those caused by the rapid change in ways of living. The trauma of transition from one culture to another was exemplified by the use of violence, abetted by alcohol, as well as many of the other psychological occurrences of a rapidly changing culture.

Associated with this difficult transition were high degrees of alcohol consumption, malnutrition, over-crowding, parental neglect, and outward violence, most of which are fundamentally related to infant death. In the following chapters, this document will explore some of these phenomena in detail and will demonstrate their relationship to infant health.

HEALTH CARE ORGANIZATION

HISTORY

From a medical/historical point of view, organized medical and health care services in the North were, until relatively recent times and for a variety of reasons, conspicuous by their absence.

The early resident physicians were usually recruited by the Hudson's Bay Company and, in addition to their main role as "Bay Traders", received an extra stipend to concern themselves with the treatment of disabled and diseased natives.

The Order of Grey Nuns was the first to establish a hospital in the Northwest Territories; this was constructed at Fort Providence in 1867. From Confederation on into the first quarter of the twentieth century, penetration of health services into the North was a result of the actions of the Roman Catholic and Anglican missionaries. Mission facilities were built at 15 separate locations in the North between 1867 and 1953.

The Federal Government in 1922 entered the Health Care picture in the Northwest Territories when, in response to persistent representation by the Church to Ottawa, the first physicians were recruited to staff the six Mission Hospitals in the NWT. Dr. Brian Brett (1969), in his article "A Synopsis of Northern Medical History" places 1926 as the date of the first resident government medical officer in Pangnirtung on Baffin Island. By 1930 there were six resident Medical Officers working in the Northwest Territories. Not until 1939 did the government start building and maintaining Health Care facilities, leading up to 1972 when a total of 35 Nursing Stations and two government operated hospitals existed, plus a hospital largely built with federal funds but operated by the municipality of Yellowknife.

The great number of hospital beds, reaching about 600 by 1950, were mostly supplied and operated by missionaries and nuns in the Slave Lake area and Mackenzie Valley for a population of about 5000 Natives and 5000 Others. This can be compared with little more than 200 hospital beds available in all of the NWT in 1973, for a population of 21000 Natives and 16000 Others.

The situation can only be understood when we recall the epidemiological history of Indians and Inuit of the NWT in the first half of this century, and in particular the period 1920 - 1950, when most of these Mission Hospitals were built or enlarged.

Following the first large-scale contacts with people from the outside was a wave of acute epidemics in the Native population: measles, influenza, whooping cough. Relatively minor "childhood" diseases to those of the South, they spread like wildfire in these isolated virgin communities, afflicting all age groups. Between 1905 - 1928, all of the Mackenzie Delta Inuit were affected, and 80 - 90 percent died. Thereafter came the slower but not less deadly "White death", tuberculosis, which infected practically everyone during the 1930's and 40's, and raged unabated until the mid 1950's. At that time the tide was turned by the advent of an effective drug treatment, together with the efforts of Government sponsored physicians and field nurses, who screened the population for new cases and sent the affected individuals to Government hospitals in Southern Canada or Church supported Mission Hospitals in the NWT. For a number of years, in the mid 1950's, 10 percent of all Inuit were in TB Sanatoria. This caused much family disruption and social upheaval, which in turn influenced health attitudes and practices of the younger generation, many of whom are the younger mothers in our study.

THE NORTHWEST TERRITORIES HEALTH SERVICE

CREATION

The Northern Health Service was organized in 1954, largely as the result of the excessive morbidity and mortality in the

North and the outcry from the various missionaries, police, traders, and many other people who were concerned.

The Northern Health Service was a joint venture of the Federal and Territorial Governments, with each paying a share of the health bill. The Service was responsible for providing a complete treatment and public health programme. In those places where there were private physicians, dentists, or non-government hospitals, the Northern Health Service relinquished its direct treatment activity, but still conducted a public health programme and monitored the quality of health care delivered to the area. Other responsibilities included the setting of standards of health care, the establishment of health ordinances and regulations, and surveillance of the standards by environmental health officers.

As in Southern Canada, the Northwest Territories had a comprehensive, universally available health insurance programme designed to cover hospital and medical care costs. This insurance programme fell under the authority of the Northwest Territories Government. Cost-sharing arrangements existed between the Territorial Government and the Federal Government for the construction of facilities and the provision of programmes, based on formulas pertaining to the percentages of White and Native populations served. The whole area of responsibility for health care services and its financing is undergoing continual review, as the Territorial Government progresses towards provincial status, and increasingly accepts the responsibility and authority for the provision and payment of health services.

ORGANIZATION

The Health Service is divided geographically into four Zones: Keewatin, Baffin, Mackenzie, and Inuvik. Each Zone is supervised by a Zone Director who is responsible for all health activity in his Zone. Each Zone Director reports to the regional office in Edmonton.

HEALTH CARE PERSONNEL

In 1973 approximately 550 people were working for the Northern Health Service. This included 25 physicians, 11 dentists, and some 150 nurses. In addition there were certified nursing assistants, psychologists, health educators, environmental health officers, and auxiliary personnel such as clerks, stenos, caretakers, and interpreters. A large proportion of the hourly rated employees were drawn from the Native people, but there were no Native doctors, dentists, or nurses. The turnover rate among the professional people was and still is high, exceeding 50 percent per year.

At the time of the study the private health sector in the North consisted of about 17 private physicians and about 6 private dentists, as well as nurses and other health personnel, who were either self-employed or employed with mission or municipally owned hospitals. There were 3 specialist doctors in private practice, located in the larger communities of Yellowknife and Hay River.

THE HEALTH CARE DELIVERY SYSTEM

Health care delivery in the study period could be described as a graded system of health care.

Family Medical Pack

The simplest level of service was the "Family Medical Pack" provided to those families living off the land for periods of months at a time. The pack consisted of the usual medical supply of bandages, analgesics, etc., together with a broad spectrum of antibiotics, and it contained clear instructions printed in the language appropriate to the user. Some people in the South may feel this to be not "good medicine", however the reality was that in such situations the term "good medicine" was a relative one and any effective first aid provision was better than none at all.

The Health Station

The simplest permanent health establishment was the Health Station. These facilities, 6 in all, were located in communities of less than 100 people, and were under the supervision of a lay dispenser. The lay dispensers came from a wide variety of backgrounds: a graduate nurse who was a house-wife in the community, a first aid man working with one of the oil companies, or a member of the local Native community. These persons had received a basic training in diagnosis and treatment, resulting in their being able to render effective first aid treatment and capable of discussing symptoms and signs of disease or injury with the nearest available doctor or nurse. Each lay dispenser had a Treatment Manual and was equipped with a radio/telephone. One of the important parts of initial training was the emphasis placed upon the limitations of their actions, and when and how to obtain help from the nurse and the doctor.

The Nursing Station

The nursing station, of which there were 38 in 1973, was the backbone of the Northern Health Service, and they were located in settlements with populations of from 100 to approximately 1000 people. Each station was equipped with out-patient facilities, in-patient beds for the more seriously ill patients, and living quarters for the staff of from 1 to 3 nurses or more. Of over-riding importance in the system was the sound judgement of the nurse as to what she could handle herself and what she should refer on to a doctor.

The northern nurse had a wide range of responsibilities and duties. She was required to be an astute diagnostician, to be able to institute effective emergency treatment and be well versed in the essentials of public health. In addition, she had to be skilled in midwifery and be able to extract teeth in an emergency situation. She was obliged to take X-rays and to some degree be able to interpret them. She had to perform minor laboratory procedures and possess considerable skill and aptitude in handling individuals with emotional problems. In addition to her medical skills she required many other personal attributes, as her relationships with the people and agencies in the settlement often governed the attitude of the community to Northern Health Services.

Because of the midwifery requirement, nurses of necessity had been recruited from outside Canada, particularly from Great Britain and New Zealand. As midwifery courses became more available, for example at Dalhousie University, many more Canadian nurses were employed.

In theory, doctors visited the nursing stations at regular intervals and medical consultation was always available by short wave radio. In practice, because of the conditions that have always existed in the Canadian North, the doctor's visits could be irregular should weather conditions be such that he could not fly in, and the communications by radio/telephone during times of magnetic storms were very difficult or completely impossible for several days on end. These geographic complications placed an even heavier burden of responsiblity on the nurse. When the weather grounded charter aircraft and atmospheric conditions prevented radio communication, the nurse could well be on her own in caring for a very sick patient.

The Health Centre

Health centres were situated in settlements where already there existed facilities for the care of the sick. The emphasis was on preventive medicine and not that of providing direct patient care. There were 9 centres in the Northwest Territories and they were in many ways the Cinderella of the Service. Emergency treatment and evacuation of patients were the dramatic events, but preventive medicine, in the long run, reduces the need for more and bigger health facilities and could pay the biggest dividends.

The Health Centre staff consisted of the Public Health Nurse, the Community Health Representatives and in the larger centres, Public Health Inspectors. The Public Health Nurse and the Public Health Inspector performed roles comparable to their counterparts in the South, but greatly complicated by the weather, increased distances and poor communications. The Community Health Representative was a Native resident of the settlement who was trained in such topics as sanitation, diet, and the dangers of alcohol and other drugs. Perhaps their most important task was the translation of the aims of preventive medicine and the implementation of it into a framework that could be readily understood and accepted by the community. They therefore played the vital liaison role between the Native community and Northern Health Service.

The Hospital

The largest health facility in the North was the hospital, which served not only the immediate locality but a very large catchment area. These were situated in the major centres of population of the North, such as Frobisher Bay, Yellowknife, and Inuvik and varied in size, the larger being staffed by teams of doctors, one of whom was a surgeon.

With 7 hospitals in the Northwest Territories during the time of the study, a total of 38 doctors were stationed there. Some doctors were salaried employees of the Department of National Health and Welfare and some were in private practice. Many doctors were mobile and a few travelled distances of up to 1609 km visiting the nursing stations.

Referrals to the South

Frequently patients required treatment beyond the scope of the facilities available in the North, and so the final points of referral were major hospitals in Southern Canada.

One Southern hospital of particular note was the Charles Camsell in Edmonton, which was operated by Medical Services and the Department of National Health and Welfare, and made available a comprehensive spectrum of specialist services. The Charles Camsell Hospital provided an environment suitable to Northern Native people. Many of the staff were Native people from the North or those who had worked and lived in the North. When patients were transferred from a northern settlement to the Charles Camsell Hospital, they experienced less of a culture shock than those transferred to other outside hospitals. Patients arriving at Camsell found people familiar with their home and surroundings, and a staff who could converse with them in their own language.

University Involvement

Until four or five years before the study started, Southern universities had little involvement with the Northern Health Service. In terms of medical care, the Health Service was virtually restricted to general practitioner type operations. During 1969 - 1970 official agreements with 4 universities in the provinces resulted in regular visits of medical specialists to the communities of the Northwest Territories. The specialists attended patients referred by the resident doctors and gave lectures to the local health personnel. Additionally, arrangements were made at the Inuvik and Frobisher Bay Hospitals for a rotating residency programme in pediatrics, otolaryngology, and medicine.

The university programme was well received by all concerned. Particularly grateful were those northern physicians still living in comparative isolation. The programme was not limited to the strictly clinical consultant. Some of the most welcome visitors were the laboratory consultant, the pathologist, bacteriologist, and the epidemiologist.

COMMENT

Although most of the above chapter has been written in the past tense, stating the situation as it existed in 1973-1975, it must be emphasized that circumstances have not changed significantly between 1975 and the time of release of this publication (1981). It is apparent also, that great effort had been made to provide an adequate level of health care for all residents of the Territories. The regional office of the Department of National Health and Welfare was transferred to Yellowknife in late 1979.

CHAPTER 3

THE PEOPLE

by C.W. Hobart and D.W. Spady

INTRODUCTION

When referring to the North the official Federal statistics classify the ethnic groups into Indian, Inuit, and Other ethnic groups. The latter includes White, Orientals, Negroes and Metis.

The people of Indian ancestry live only in the western part of the Territories around Great Slave Lake and up the Mackenzie Valley to Inuvik on the Beaufort Sea. Approximately 7400 are Treaty Indians. The Metis Association claims that there are almost as many Metis, but there is some obvious overlap between both groups and the total number of persons claiming full or part Indian in the NWT during 1973 was likely close to (but not exceeding) 10000.

The groups include the Dogrib, the Slave, the Chipewyan, the Hare, the Loucheux (Kutchin), and the Yellowknife, with each retaining its traditional social structure and language. For generations past the arch-enemy was the Inuit, and there were many battles between the two races at the edge of the treeline. Today, however, they are not only tolerant of each other, but to an increasing extent are joining forces politically to confront the various levels of government on such subjects as treaty rights and land claims in the North.

The Inuit, with a total population of 13600 in 1974, is the other main race in the North. With few exceptions they live on the barren land above the treeline. Traditionally their population distribution was spread thinly over the Arctic in small camps, their size depending on the availability of food. This way of life has generally changed and the nomadic wandering has given way to living in permanent settlements. Unlike the Indians, the Inuit groups had no organized leadership and where there was a "leader", he was followed because of his hunting prowess, his wisdom or his demonstrated supernatural powers. This situation is changing rapidly with the establishment of permanent communities, as is their concept and practice of extended families.

The Metis have a diverse origin. A few are descendents of Metis coming with fur traders, but most are the offspring of more recent mixed unions or are the descendents of Indians who gave up their treaty rights for White "privileges".

The original Native culture was based on hunting and trapping, either for food or for trading purposes. The seasonal movements of the band were dictated by the search for fish and game. While some of this still remains, the majority of Natives, both Inuit and Indian, are now settled in permanent communities where schools, health facilities, churches, stores and government offices are located. Although hunting remains a popular source of food and income, to a great extent the availability of a cash income has changed the lifestyle from one of hunting to one of wages and welfare cheques.

At the time this study began the camps in the bush and on the tundra, where Indian and Inuit households lived the year round, had almost completely disappeared from the scene. The establishment of day schools and nursing stations in all but a very few small settlements had been the attracting factors. More importantly, the availability of subsidized housing programmes which offered cost-assisted servicing and heating had lured all but a handful of people off the land into permanent residence in the settlements. In the Spring, and perhaps for shorter periods at other seasons of the year, many still went to their camps, but the settlement had become the place of permanent residence. To an increasing degree bush camps were used in the same way that Whites would use them, for recreational visits.

In 1901 there were no more than 219 Whites in the Northwest Territories. In 1973 they were the most conspicuous addition to the Northern Scene and numbered some 12000. They succeeded the sprinkling of trading post managers, priests and R.C.M.P., who for the previous hundred years had comprised the non-Native presence in the North. Many of the new arrivals were civil servants come to staff the rapidly growing Territorial and Federal Government offices which, due to the mushrooming of exploration activity since about 1970, have substantially expanded their strength. These people are typically young, usually married, and in the prime of their child bearing years. Although commonly located in the larger centres: Yellowknife, Hay River, Fort Smith, Fort Simpson, Inuvik, and Frobisher Bay, they are also found in the very small places as well; in communities like Fort Franklin, Broughton Island, Clyde River, Snowdrift and Wrigley. They play a role in teaching school, in game management, in the Royal Canadian Mounted Police, in the settlement Manager's or Council Secretary's office. Needless to say, the amenities they enjoy and the way they live their lives, at least within the four walls of their homes, are quite indistinguishable from the way they would be living in Southern Canada. Individually their presence in the North is often fleeting, many staying only for a brief "term of service". However, there is a slowly increasing number of northern born Whites.

Among the major population groups there are two major Inuit dialects, six distinct Indian languages, plus English, and European tongues. This diversity of languages is a major factor contributing to communication problems between various groups and Government agencies.

THE PEOPLE OF THE STUDY

The rest of this chapter will attempt to describe the socio-economic circumstances of the families of the 1191 infants who constitute the total population of the project. In order to better define the subjects of this undertaking the traditional population grouping mentioned earlier has been replaced with a more socio-ethnically ordered classification: the Inuit, Indian, White, Mixed and Other groups. The following outlines the rationale of this classification.

GROUPING OF THE STUDY FAMILIES

There was a wide diversity of inter-marriage and inter-mating patterns to be accommodated. In those cases of ethnically homogeneous unions there was little problem; children of homogeneous Inuit, Indian, and White parentage were so classified. Children of Metis or mixed Metis and Indian parentage were classified as Indian, because the Indians and the Metis of the Northwest Territories have much common ground - genetically as well as in the pattern of life styles. The Metis may be slightly more acculturated, and hence slightly more affluent and tend more to wage employment than do the Indians.

Critical considerations of ethnically mixed unions were whether or not the couples were married, or, if unmarried, whether the mother was Native or not. These considerations gave rise to two further categories: those children who retained the ethnic classification of their mother, and those children who were classified as of Mixed ethnic origin.

The first were those children born of the unwed unions of Native women, where the children retained the same ethnic origin as their mother. Those children having White or other (Oriental, etc.) fathers and unwed Native mothers were assigned to the ethnic category of the mothers -- Inuit or Indian. The reason for this was that such children were typically incorporated into the parental family of the mother, and so raised in the context of her cultural and economic and life style patterns. If the baby was "adopted out" as it could be, it was very often adopted by relatives of the mother.

The second group, those children classified as Mixed, fell into three categories:

1. In families where Native women married White men, it was felt that the family life style would reflect components contributed by both cultures. However because of the influence of the rather generous incomes that White men typically earn in the Northwest Territories, because we felt confident that such families would typically reflect substantial male dominance, and because White life style patterns are increasingly influential in the Territories, we considered that the life styles of these families would be

quite White-like.

2. In those families where White women were married to Native men, the White mothers would likely try to raise their children according to White standards and since most of the Native husbands were attractively employed, this was possible.

3. In the final category, where White women bore children by Native men to whom they were not married, it was anticipated that many such babies would be given up for adoption. In fact, this rarely occurred. The social class and economic circumstances of these women were rather meagre, in part because of their backgrounds, and in part because their children reduced their employability. These mothers often continued their patterns of association with Native men, rather than being centrally involved in White community associations.

Common to this mixed group is a certain amount of Native cultural and/or associational involvement, attenuating the White cultural emphasis which is expected to be the more dominant in virtually every case. In summary, the four major categories were: Indian, Inuit, White and Mixed. In addition to the above, there was a small number of infants who, for various reasons, fell into none of these categories; these children were considered Other.

Instead of describing each ethnic group separately, an attempt will be made to describe the groups together under various aspects of their life style.

GENERAL DEMOGRAPHIC INFORMATION

There were 1191 infants in the study; the largest category (454) were Inuit, with White infants a close second at 369. Although there were 1191 infants, there were 12 sets of twins and hence the tables have a base value of 1179, which is the number of pregnancies involved.

TABLE 3-1
GEOGRAPHIC AND ETHNIC DISTRIBUTION OF STUDY INFANTS

Zone	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Baffin	208	46.3	0	0	26	7.2	13	18.1	0	0	247	20.9
Inuvik	47	10.5	81	30.2	59	16.3	15	20.8	12	41.4	214	18.2
Mackenzie	82	18.3	187	69.8	267	74.0	40	55.6	17	58.6	593	50.3
Keewatin	112	24.9	0	0	9	2.5	4	5.6	0	0	125	10.6
Total	449		268		361		72		29		1179	

Table 3-1, which gives the ethnic breakdown of the study infants, also shows that the majority of infants (50.3%) lived in the Mackenzie zone while Keewatin had the fewest study infants

(10.6%). The Inuit parents tended to live in all regions but more so in the Baffin/Keewatin zones (71.2%) whereas Indians were limited in residence to the Mackenzie and Inuvik zones. The White infants were represented in all zones but predominantly in the Mackenzie zone (74%). This is consistent with the general knowledge that the Mackenzie Valley area is presently undergoing considerable Southern invasion.

Tables 3-2 to 3-4 present information regarding the size and degree of isolation of the community from the outside world.

Table 3-2
POPULATION AT MOTHER'S PLACE OF RESIDENCE

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
PEOPLE	N	%	N	%	N	%	N	%	N	%	N	%
<499	172	38.3	73	27.2	14	3.9	12	16.7	1	3.4	272	23.1
500-1500	206	45.9	64	23.9	81	22.4	19	26.4	5	17.2	375	31.8
>1500	71	15.8	131	48.9	266	73.7	41	56.9	23	79.3	532	45.1
Total	449		268		361		72		29		1179	

Table 3-3
PLANE FLIGHTS

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
FLIGHTS	N	%	N	%	N	%	N	%	N	%	N	%
<1	120	26.7	78	29.2	10	2.8	4	5.6	--	--	212	18.0
2-5	250	55.7	72	27.0	39	10.9	21	29.1	5	17.1	387	32.8
6+	79	17.6	117	43.7	312	86.4	47	65.2	24	82.7	579	49.2
No Data			1								1	
Total	449		268		361		72		29		1179	

Table 3-4
TIME DELAY FACTOR (HOURS)

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
TIME	N	%	N	%	N	%	N	%	N	%	N	%
<4	71	15.8	108	40.3	288	79.8	47	65.3	24	82.8	538	45.6
4-12	251	55.9	156	58.2	68	18.8	21	29.2	5	17.2	501	42.5
13+	127	28.3	4	1.5	5	1.4	4	5.6	--	--	140	11.9
Total	449		268		361		72		29		1179	

Nearly 40 percent of the Inuit infants and over 25 percent of the Indian infants lived in communities of less than 500 individuals. This can be compared with the White, Mixed and Other groups in which between 55 and 80 percent lived in communities of more than 1500 individuals. Similar differences are seen in the frequency of plane flights into these communities . Table 3-4 indicates the length of time between the onset of serious illness and the earliest definitive medical care by a physician. Table 3-5 shows that only 35 infants in the study did not have access to medical care in their community; most Inuit were nearer to nursing stations whereas most Whites were nearer to hospitals.

Table 3-5
TYPE OF MEDICAL FACILITY AVAILABLE

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
FACILITY	N	%	N	%	N	%	N	%	N	%	N	%
None	4	0.9	9	3.4	6	1.7	--	--	--	--	19	1.6
Health Station	5	1.1	9	3.4	--	--	1	1.4	--	--	15	1.3
Nursing Station	369	82.2	105	39.3	72	19.9	25	34.7	5	17.2	576	48.9
Hospital	71	15.8	144	53.7	283	78.4	46	63.9	24	82.8	568	48.1
Other			1								1	0.0
Total	449		268		361		72		29		1179	

The relative immobility of the Native groups in the NWT is reflected in Tables 3-6 to 3-10 which show the number of years of living in the present settlement, of living in other settlements and of living in hunting camps. Within each category, the Inuit, Indian and White parents as classes show similar relationships in regards to duration of residence in these communities; however, the Inuit and Indian parents had lived considerably longer in the settlements compared with the recently arrived Whites.

Table 3-6
MOTHER - YEARS LIVED IN PRESENT SETTLEMENT

	INUIT	INDIAN	WHITE	MIXED	OTHER	TOTAL
Mean	13.23	19.12	4.10	10.51	7.09	
S.D.	8.54	11.76	4.65	9.08	6.29	
Median	11.79	20.0	2.60	6.25	4.00	
Total	383	209	305	59	23	979

No Data = 200

Table 3-7
FATHER - YEARS LIVED IN PRESENT SETTLEMENT

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	13.99	26.04	4.61	7.29	8.37
S.D.	9.99	17.54	5.25	7.38	8.47
Median	11.92	26.00	2.92	4.50	4.67
Total	343	166	289	54	19
No Data	106	102	72	18	10

Table 3-8
MOTHER - YEARS LIVED IN OTHER SETTLEMENTS IF APPLICABLE

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	12.90	11.03	4.33	14.58	6.33
S.D.	9.83	8.57	3.39	10.32	7.20
Median	11.08	6.50	3.50	15.25	3.50
Total	151	64	46	31	6
Not Applic	211	124	213	24	13
No Data	87	80	102	17	10

Table 3-9
FATHER - YEARS LIVED IN OTHER SETTLEMENT

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	12.95	13.0	3.6	3.6	12.6
S.D.	10.6	12.3	3.2	3.2	8.5
Median	9.5	8.0	2.6	2.2	0.5
Total	126	39	47	14	5

Table 3-10
MOTHER - YEARS LIVED IN HUNTING CAMPS IF APPLICABLE

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	17.33	7.16	0	8.5	5.00
S.D.	10.40	5.96	0	5.01	--
Median	15.06	6.00	0	8.50	--
Total	220	18	0	6	1
Not Applic	130	167	263	47	17
No Data	99	83	98	19	11

The Mixed and Other groups are different in that the mother generally had lived in the settlement or hunting camp for a longer time than had the father. Since the ethnicity of the father in these two groups was largely White or Other (i.e. Oriental, Negro, or unknown), this observation is not unexpected; although Table 3-11 shows that the average duration of residence in the NWT of these fathers was 10-15 years.

Table 3-11
AVERAGE DURATION OF NWT RESIDENCE OF FATHER

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	33.19	32.98	5.56	10.59	14.15
S.D.	12.05	15.67	5.76	11.61	9.78
Median	31.25	31.70	3.62	6.83	10.50
Total	339	170	270	54	20
No Data	110	98	91	18	9

Familial Demographic Characteristics

From Table 3-12 it can be seen that the average age of the mother was in the mid-twenties for all groups and lower than that of the father (Table 3-13).

Table 3-12
AVERAGE AGE OF THE MOTHER

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	24.98	24.81	25.24	23.38	22.24
S.D.	6.85	6.69	4.63	4.80	4.26
Median	23.34	23.34	24.86	22.50	20.80
Total	447	268	360	72	29
No Data	2	0	1	0	0

Table 3-13
AGE OF THE FATHER

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	34.18	36.6	29.38	29.41	28.19
S.D.	10.86	12.1	5.28	8.30	8.98
Median	31.73	33.4	28.57	28.20	24.75
Total	371	189	308	61	21
No Data	78	79	53	11	8

The Native father tended to be older - at an average age of 35, than the White father, who was about 30 years of age. It was interesting to find that only 10 percent of the mothers of White infants were less than 20 years of age whereas 21 percent of Inuit and 35 percent of Indian mothers were less than 20 years of age. The range of ages was great - varying from 13 to 47 years of age in the mothers and from 19 to 80 years in the fathers; these extremes were observed in the Inuit and Indian groups.

The number of children in the household under 16 years of age varied among the ethnic groups (Table 3-14) ranging from 3.9 among Inuit families to 1.9 among Whites.

Table 3-14
NUMBER OF CHILDREN UNDER 16 YEARS (PER HOUSE)

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	4.10	4.09	1.87	2.29	2.13
S.D.	2.29	2.59	0.99	1.48	1.29
Median	3.83	3.49	1.69	1.92	1.89
Total	402	219	307	63	23
No Data	47	49	54	9	6

The number of adults living under the same roof was also greater among the Inuit and Indian than among the White families (Tables 3-15 and 3-16), as was the number of family units (Table 3-17).

Table 3-15
NUMBER OF FEMALE ADULTS IN HOUSE

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	1.38	1.47	1.02	1.10	1.30
S.D.	0.66	0.76	0.15	0.35	0.77
Median	1.21	1.25	1.01	1.04	1.11
Total	402	219	308	63	23
No Data	47	49	53	9	6

Table 3-16
NUMBER OF MALE ADULTS IN HOUSE

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	1.35	1.30	1.02	1.21	1.04
S.D.	0.70	0.82	0.20	0.70	0.56
Median	1.19	1.13	1.01	1.08	1.00
Total	402	219	308	63	23
No Data	47	49	53	9	6

Table 3-17
NUMBER OF FAMILY UNITS PER HOUSE

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	1.42	1.46	1.03	1.27	1.30
S.D.	0.64	0.79	0.18	0.79	0.76
Median	1.26	1.24	1.01	1.11	1.10
Total	400	219	307	63	23
No Data	49	49	54	9	6

In most cases, the father figure was the natural father although in 4.0 percent of Inuit and 7.7 percent of Indians there was no father figure at all (Table 3-18).

Table 3-18
HEAD OF FAMILY

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
HEAD	N	%	N	%	N	%	N	%	N	%	N	%
Natural Father	295	74.1	140	67.6	305	98.1	58	93.5	16	69.6	814	81.3
Stepfather	17	4.3	25	12.1	1	0.3	--	--	1	4.3	44	4.4
Adoptive Father	67	16.8	15	7.2	2	0.6	2	3.2	2	8.7	88	8.8
Foster Father	3	0.8	11	5.3	--	--	1	1.6	1	4.3	16	1.6
No Father Figure	16	4.0	16	7.7	3	1.0	1	1.6	3	13.0	39	3.9
No Data	51		61		50		10		6		178	
Total	449		268		361		72		29		1179	

It was found the number of pregnancies varied considerably, averaging 2.1 among mothers of White infants to 4.4 among Inuit mothers. Almost 10 percent of Inuit mothers (42/452) reported having 10 or more pregnancies compared to 7.5 percent of Indian mothers. No other group of mothers had this many pregnancies. These data are presented in Chapter 4 which describes obstetric phenomena.

Table 3-19 shows that, while most infants were born to married women, there was considerable variation between the ethnic groups.

Table 3-19
MARITAL STATUS OF MOTHER

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
STATUS	N	%	N	%	N	%	N	%	N	%	N	%
Single	105	23.4	101	38.3	10	2.8	--	--	16	55.2	232	19.5
Married	321	71.5	135	51.1	345	95.8	72	100.	10	34.5	883	74.3
Widowed	5	1.1	1	0.4	--	--	--	--	--	--	6	0.5
Divorced	1	0.2	2	0.8	--	--	--	--	--	--	3	0.3
Separated	2	0.4	4	1.5	3	0.8	--	--	1	3.4	10	0.8
Other	10	2.2	21	8.0	2	0.6	--	--	2	6.9	35	2.9
No Data	5		4		1						10	
Total	449		268		361		72		29		1179	

Virtually all the mothers of White and Mixed infants were married, whereas only 51 percent of Indian mothers and 35 percent of Other mothers were married. In all instances the mother remained alive during the first year of life. This is in contrast to the eight deaths observed among the men for the same period (Tables 3-20 and 3-21).

Table 3-20
NATURAL MOTHER

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL
	N	%	N	%	N	%	N	%	N	%	
Alive	407	100.	221	100.	311	100.	63	100.	23	100.	1025
No Data	42		47		50		9		6		154
Total	449		268		361		72		29		1179

Table 3-21
NATURAL FATHER

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Alive	369	98.9	180	98.4	311	100.	62	98.4	21	100.	943	99.1
Dead	4	1.1	3	1.6	--	--	1	1.6	--	--	8	0.9
No Data	76		85		50		9		8		228	
Total	449		268		361		72		29		1179	

Tables 3-22 and 3-23 show that in all categories except Mixed, most mothers were of ethnic stock similar to the infant, whereas the fathers' ethnicity, while commonly the same as that of the infant, varied much more.

Table 3-22
ETHNIC GROUP OF INFANTS COMPARED BY ETHNIC GROUP OF MOTHER

INFANTS-	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
Mother	N	%	N	%	N	%	N	%	N	%	N	%
Inuit	449	100.	--	--	--	--	24	33.3	--	--	473	40.1
Indian	--	--	196	73.1	--	--	19	26.4	--	--	215	18.2
White	--	--	--	--	361	100.	7	9.7	29	100.	397	33.7
Other	--	--	72	26.9	--	--	22	30.6	--	--	94	8.0
Total	449		268		361		72		29		1179	

Table 3-23
ETHNIC GROUP OF INFANTS COMPARED BY ETHNIC GROUP OF FATHER

INFANTS-	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
Father	N	%	N	%	N	%	N	%	N	%	N	%
Inuit	385	95.3	9	4.1	--	--	5	6.9	1	5.3	400	37.2
Indian	3	0.7	129	63.6	--	--	2	2.8	3	15.8	137	12.8
White	14	3.5	22	10.1	361	100.	65	90.3	--	--	462	43.1
Other	2	0.5	57	26.3	--	--	--	--	15	78.9	74	6.9
No Data	45		51						10		106	
Total	449		268		361		72		29		1179	

CHILD CARE

Overall, 85 infants were given up for permanent adoption at birth; 80 percent of these were infants of Inuit mothers (Table 3-24).

Table 3-24
PERMANENT ADOPTION AT BIRTH

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL
	N	%	N	%	N	%	N	%	N	%	
Yes	68	16.6	21	9.2	3	1.0	2	3.1	2	8.0	96
No	341	83.4	207	90.7	311	99.0	63	96.9	23	92.0	945
No Data	40		40		47		7		4		138
Total	449		268		361		72		29		1179

With Inuit and Indian infants the adoptive mother was related to the natural mother in 65 percent of cases, whereas with the White and Mixed infants there was no such relationship (Table 3-25).

Table 3-25
RELATIONSHIP OF ADOPTIVE MOTHER TO NATURAL MOTHER

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Not Applicable	339	84.5	199	90.0	309	99.4	61	96.8	22	95.7	930	91.3
None	20	5.0	10	4.5	2	0.6	2	3.2	--	--	34	3.3
Yes	42	10.5	12	5.4	--	--	--	--	1	4.3	55	5.4
No Data	48		47		50		9		6		160	
Total	449		268		361		72		29		1179	

In the case of Inuit and Indian infants, the age of the adoptive mother was over 35, suggesting that it was the grandmother who "adopted" the child (Table 3-26).

Table 3-26
AGE OF ADOPTIVE MOTHER

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	39.97	35.1	32.0	29.0	26.0
S.D.	9.3	10.7	4.2	4.2	1.4
Median	39.3	29.0	29.5	26.5	25.5
Total	68	21	2	2	2

Apart from adoption, it was not uncommon for an infant to be separated from its mother. Separation refers to separation for medical purposes and data in Tables 3-27 and 3-28 show that almost 20 percent of Inuit infants were separated from their mothers in the first year of life; this can be compared to 24 percent of Indian infants but only 2 percent of White infants.

Table 3-27
NUMBER OF SEPARATIONS FROM MOTHER - IF SEPARATED

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	1.69	1.90	1.00	1.00	1.00
Median	1.49	1.56	--	--	--
Total	81	52	6	1	2
Not Separated	330	165	303	63	21
% Separated	19.9	23.9	1.94	1.6	8.7
No Data	42	51	52	9	6

Table 3-28
FREQUENCY AND DURATION OF FOSTER CARE

	INUIT	INDIAN	WHITE	MIXED	OTHER
Duration:					
Mean	2.58	5.68	3.0	2.5	9
S.D.	2.50	4.4	--	2.12	4.24
Median	1.78	4.00	--	2.5	9
Total	31	19	1	2	2
Not Fostered	375	196	307	61	21
% Fostered	7.7	8.9	0.3	3.2	8.7
No Data	43	53	53	9	6

The two major Native groups had more separations, starting at an earlier age that did the other three groups of children. Fostering was also somewhat more common among Inuit and Indian infants. In some cases this may reflect fostering of a child while in Southern Canada recovering from an illness. For most infants, the average length of foster care varied between 2.4 and 6.0 months. About 35 - 40 percent of Inuit and Indian infants were not generally under the care of their natural mother, whereas only 4 percent of White infants were not (Table 3-29).

Table 3-29
CARE OF NATURAL MOTHER

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Not Applicable	4	1.0	2	0.9	1	0.3	--	--	--	--	7	0.7
Yes	246	60.1	142	64.0	301	96.8	58	92.1	20	83.3	767	74.5
No	159	38.9	78	35.1	9	2.9	5	7.9	4	16.7	255	24.8
No Data	40		46		50		9		5		150	
Total	449		268		361		72		29		1179	

Tables 3-30 and 3-31 show that, generally speaking, few infants were cared for away from home during the day.

Table 3-30
CARE AWAY FROM HOME DURING THE DAY

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
None	358	92.0	190	89.6	264	86.0	49	80.3	18	78.3	879	88.6
Morning	2	0.5	2	0.9	1	0.3	--	--	--	--	5	0.5
Afternoon	5	1.3	3	1.4	3	1.0	2	3.3	--	--	13	1.3
All Day	17	4.4	15	7.1	36	11.7	10	16.4	5	21.7	83	8.4
Not Applicable	7	1.8	2	0.9	3	1.0	--	--	--	--	12	1.2
No Data	60		56		54		11		6		187	
Total	449		268		361		72		29		1179	

Table 3-31
CARE AWAY FROM HOME BY OTHER THAN MOTHER

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
None	302	82.5	159	76.8	250	84.5	46	75.4	18	81.8	775	81.4
Morning	4	1.1	4	1.9	1	0.3	--	--	--	--	9	0.9
Afternoon	10	2.7	5	2.4	3	1.0	2	3.3	--	--	20	2.1
Evening	1	0.3	4	1.9	2	0.7	--	--	--	--	7	0.7
All Day	42	11.5	32	15.5	37	12.5	13	21.3	4	18.2	128	13.4
Not Applicable	7	1.9	3	1.4	3	1.0	--	--	--	--	13	1.3
No Data	83		61		65		11		7		227	
Total	449		268		361		72		29		1179	

Tables 3-32 to 3-40 present details about the nature of child care at home. They will not be exhaustively outlined here but a few pertinent comments can be made. In the majority of cases, for all ethnic groups, clothes were kept clean and in good repair, but between 10 and 14 percent of Native families defaulted in this area (Tables 3-32 and 3-33).

Table 3-32
ARE CLOTHES CLEAN?

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Yes	348	88.1	187	89.0	272	99.6	55	96.5	18	94.7	880	92.2
No	47	11.9	23	11.0	1	0.4	2	3.5	1	5.3	74	7.8
No Data	54		58		88		15		10		225	
Total	449		268		361		72		29		1179	

Table 3-33
ARE CLOTHES IN GOOD REPAIR?

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Yes	286	85.9	165	88.7	253	99.2	52	98.1	18	94.7	774	91.5
No	47	14.1	21	11.3	2	0.8	1	1.9	1	5.3	72	8.5
No Data	116		82		106		19		10		333	
Total	449		268		361		72		29		1179	

Most mothers sewed some of the infants' clothes, though a few mothers (<10%) sewed all (Table 3-34).

Table 3-34
ARE CLOTHES SEWN BY MOTHER?

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
All	25	6.3	10	4.6	19	6.2	2	3.2	1	4.3	57	5.7
Some	297	75.2	129	59.2	176	57.3	27	43.5	12	52.2	641	63.8
None	73	18.5	79	36.2	112	36.5	33	53.2	10	43.5	307	30.5
No Data	54		50		54		10		6		174	
Total	449		268		361		72		29		1179	

Carrying the infant in the Amauti is a traditional Inuit habit and ensures continuous maternal-child contact (Table 3-35). Almost 90 percent of Inuit mothers and 48 percent of Indian mothers used this traditional backpack for some of the time. Few mothers of the White, Mixed, or Other groups did so.

Table 3-35
MOTHER WEARS AMAUTI OR BACKPACK

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
No	35	8.8	102	53.1	268	88.2	39	63.9	14	73.7	458	47.0
Infancy	213	53.4	59	30.7	29	9.5	17	27.9	5	26.3	323	33.2
3 Years	151	37.8	31	16.1	6	2.0	5	8.2	--	--	193	19.8
No Data	50		76		58		11		10		205	
Total	449		268		361		72		29		1179	

Table 3-36
MOTHER WEARS A ZIPPERED PARKA

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
No	265	67.3	86	46.2	129	41.9	32	52.5	9	39.1	521	53.7
All Time	33	8.4	39	21.0	101	32.8	14	23.0	5	21.7	192	19.8
Most Time	96	24.4	60	32.3	78	25.3	15	24.6	9	39.1	258	26.6
No Data	55		83		53		11		6		208	
Total	449		268		361		72		29		1179	

Table 3-36 suggests that more Inuit mothers than Indian or White mothers tended to wear traditionally made parkas rather than commercially produced ones.

Among those infants wearing boots, Native infants tended to wear native made boots whereas White infants wore purchased boots (Table 3-37).

Table 3-37
TYPE OF BOOTS AVAILABLE FOR CHILDREN

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Native	226	71.1	84	59.2	27	14.5	25	52.1	8	44.4	370	52.0
Purchased	92	28.9	58	40.8	159	85.5	23	47.9	10	55.6	342	48.0
Not Applicable	76		74		117		13		3		283	
No Data	55		53		58		11		7		184	
Total	449		268		361		72		29		1179	

An attempt was made to assess the quality of care received by the infant. These data are summarized in Tables 3-38 to 3-40.

Table 3-38
GENERAL LEVEL OF CHILD CARE

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Above Average	95	23.9	24	11.4	73	26.7	17	29.3	5	26.4	214	22.3
Average	268	67.3	169	80.5	200	73.3	41	70.7	13	68.4	691	72.1
Poor	35	8.8	17	8.1	--	--	--	--	1	3.4	53	5.5
No Data	51		58		88		14		10		221	
Total	449		268		361		72		29		1179	

Table 3-39
TREATMENT OF CHILD

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
TREATMENT	N	%	N	%	N	%	N	%	N	%	N	%
Above Average	128	33.2	47	4.6	89	32.7	21	37.5	7	36.8	292	31.0
Average	220	57.1	142	74.3	183	67.3	34	60.7	11	57.9	590	62.6
Poor	31	8.1	16	8.4	--	--	--	--	1	5.3	48	5.1
Rejected	--	--	4	2.1	--	--	1	1.8	--	--	5	0.5
Gross Neglect	6	1.6	2	1.0	--	--	--	--	--	--	8	0.8
Not Applicable	10		2		1		2		--		15	
No Data	54		55		88		14		10		221	
Total	449		268		361		72		29		1179	

Table 3-40
COMPARISONS OF TREATMENT OF OTHER CHILDREN

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
TREATMENT	N	%	N	%	N	%	N	%	N	%	N	%
Better	33	10.1	8	4.8	8	5.3	1	1.8	--	--	50	7.2
Same	286	87.7	156	92.9	144	35.2	37	66.1	9	100	632	91.2
Worse	7	2.1	4	2.4	--	--	--	--	--	--	11	1.6
Not Applicable	58		37		117		18		8		238	
No Data	65		63		92		16		12		248	
Total	449		268		361		72		29		1179	

These observations are made by the nurse, priest or other individual who knew the family well and are subjective judgments; therefore, these data must be viewed with caution. The data speak for themselves and suggest that, on the whole, the child was receiving average or better than average treatment. There were only 8 cases considered by the observers to exhibit gross neglect, 5 of rejection and 48 cases receiving "poor" care. Virtually all of these cases were in Native families.

THE HOME

Data describing the type of homes that the children lived in are summarized in Tables 3-41 to 3-50.

The quality of the housing was average for the majority of the families of all ethnic groups. Above average housing was fairly common among the White and Mixed families (27% and 21% respectively) whereas below average housing was more common among the Inuit, Indian, and Other groups.

Table 3-41
QUALITY OF HOUSING

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
HOUSING	N	%	N	%	N	%	N	%	N	%	N	%
Above Average	57	14.2	21	9.8	75	27.6	12	21.1	3	15.8	168	17.5
Average	292	73.0	163	76.2	181	66.5	41	71.9	14	73.7	691	71.8
Poor	51	12.7	30	14.0	16	5.9	4	7.0	2	10.5	103	10.7
No Data	49		54		89		15		10		217	
Total	449		268		361		72		29		1179	

Most homes were of a frame construction. Log homes and shacks were also common among Inuit and Indian families whereas apartments and trailers were more common among the families of White, Mixed and Other infants. An enclosed porch or anteroom is an important feature of northern housing, its purpose is to separate the rest of the home from the main entrance in order to reduce the draftiness and the rapid cooling of the house when the door is opened; 83 percent of Inuit houses had this feature.

Fifty percent of Indian and White families had porches, most likely this is because there was less need for a porch in the more protected forested areas of the Territories where Indians lived. A large proportion of White families lived in apartments and trailers where such a porch may not be as much of a necessity.

Table 3-42
TYPE OF ACCOMMODATION

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
HOUSE	N	%	N	%	N	%	N	%	N	%	N	%
Log House	43	10.7	53	24.3	29	9.5	10	15.9	5	22.7	140	13.8
Frame	296	73.4	132	60.6	134	43.8	29	46.0	6	27.3	597	59.0
Shack	52	12.9	9	4.1	3	1.0	2	3.2	1	4.5	67	6.6
Tent	1	0.2	2	0.9	--	--	--	--	--	--	3	0.3
Apartment	6	1.5	9	4.1	44	14.4	6	9.5	3	13.6	68	6.7
Trailer	2	0.5	7	3.2	76	24.8	13	20.6	5	22.7	103	10.2
Other	3	0.7	6	2.8	20	6.5	3	4.8	2	9.1	34	3.4
No Data	46		50		55		9		7		167	
Total	449		268		361		72		29		1179	

Table 3-43
HOUSE HAS A PORCH

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
PORCH	N	%	N	%	N	%	N	%	N	%	N	%
Yes	336	83.8	111	50.9	183	59.8	42	66.7	13	56.5	685	67.9
No	65	16.2	107	49.1	123	40.2	21	33.3	10	43.5	325	32.1
No Data	48		50		55		9		6		168	
Total	449		268		361		72		29		1179	

Crowded housing was more common among the Inuit and Indians (Table 3-44) and in these groups the average number of persons/bedroom was about 3, as compared to 1.6 persons/bedroom for White families (Table 3-45).

Table 3-44
CROWDEDNESS OF HOUSING

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
CROWDING	N	%	N	%	N	%	N	%	N	%	N	%
Above Average	80	20.0	36	16.8	81	29.9	18	31.6	4	21.1	219	22.8
Average	257	64.1	135	63.1	171	63.1	34	39.6	13	68.4	610	63.4
Poor	64	16.0	43	20.1	19	7.0	5	8.8	2	10.5	133	13.8
No Data	48		54		90		15		10		217	
Total	449		268		361		72		29		1179	

Table 3-45
NUMBER OF PERSONS PER BEDROOM

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	3.03	3.02	1.64	2.00	1.78
S.D.	1.18	1.63	0.62	0.91	0.60
Median	2.89	2.65	1.64	1.91	1.82
Total	394	211	295	63	23
No Data	55	57	66	9	6

Information describing water supply and plumbing is found in Tables 3-46 to 3-49. In the vast majority of cases, water supply was delivered year round, however, among the Indian families, water supply was less reliable and 11.6 percent of families had to be actively involved to ensure an adequate water supply throughout the year. This may be compared with the 3.8 percent of Inuit and 0.9 percent of White families having similar responsibilites. Water was hand-dipped in less than 20 percent of Inuit, White, Mixed, and Other families but was necessary in 33 percent of Indian families. These statistics suggest that even though a family may have a year round water supply, it does not mean that they have "running water" in the Southern sense. In only the White families was "running water" a nearly constant finding.

Indoor flush toilet facilities were much less common among the Native groups than among the White. Nearly all (92.3%) of the White families had flush toilets; the remainder--24 families--had indoor vented or bucket or outdoor toilets. This may be compared to the Inuit, where only 8 percent of the families had indoor flush toilets, 92 percent had either indoor vented or bucket toilets. These latter two types of toilets are nearly identical except that one type is vented to the outside. and thus is less smelly; both require frequent and regular manual removal of waste products to the outside and hence both are less hygienic than the flush toilet. Flush toilets were found in 34 percent of Indian families, but this ethnic group also had the highest percentage of outdoor facilities (28%). Mixed and Other groups tended to be similar to the White families.

Bathtubs were not available in 68 percent of Inuit and 58 percent of Indian homes. Only 2 percent of White homes had no bathtubs. Where bathtubs were available, they generally were used.

Table 3-46
WATER SUPPLY

WATER	INUIT N	INUIT %	INDIAN N	INDIAN %	WHITE N	WHITE %	MIXED N	MIXED %	OTHER N	OTHER %	TOTAL N	TOTAL %
Delivered Year Round	377	96.2	181	88.3	301	99.0	61	100	23	100	943	95.7
Delivered Seasonally	4	1.0	4	2.0	--	--	--	--	--	--	8	0.8
Household Respons. Year Round	11	2.8	19	9.3	2	0.7	--	--	--	--	32	3.2
Household Respons. Seasonally	--	--	1	0.5	1	0.3	--	--	--	--	2	0.2
No Data	57		63		57		11		6		194	
Total	449		268		361		72		29		1179	

Table 3-47
WATER HAND DIPPED

	INUIT N	INUIT %	INDIAN N	INDIAN %	WHITE N	WHITE %	MIXED N	MIXED %	OTHER N	OTHER %	TOTAL N	TOTAL %
Yes	33	17.1	46	32.6	4	1.3	4	7.1	--	--	87	12.3
No	160	82.9	95	67.4	294	98.7	52	92.9	21	100.	622	87.7
No Data	256		127		63		16		8		470	
Total	449		268		361		72		29		1179	

Table 3-48
TOILET FACILITIES

TOILET	INUIT N	INUIT %	INDIAN N	INDIAN %	WHITE N	WHITE %	MIXED N	MIXED %	OTHER N	OTHER %	TOTAL N	TOTAL %
Outdoor Only	1	0.2	61	28.1	4	1.3	1	1.6	--	--	67	6.6
Indoor Bucket	172	43.0	57	26.3	10	3.3	11	17.7	2	8.7	252	25.0
Indoor Vented	196	49.0	25	11.5	10	3.3	7	11.3	--	--	238	23.6
Indoor Flush	31	7.7	74	34.1	283	92.2	43	69.4	21	91.3	452	44.8
No Data	49		51		54		10		6		170	
Total	449		268		361		72		29		1179	

Table 3-49
AVAILABILITY AND USE OF BATHTUB

BATHTUB	INUIT N	INUIT %	INDIAN N	INDIAN %	WHITE N	WHITE %	MIXED N	MIXED %	OTHER N	OTHER %	TOTAL N	TOTAL %
Not Available	270	68.2	128	58.7	6	2.0	10	16.1	2	8.7	416	41.4
Not Used	30	7.6	1	0.5	--	--	1	1.6	1	4.3	33	3.2
Used	96	24.2	89	40.8	300	98.0	51	82.3	20	87.0	556	55.3
No Data	53		50		55		10		6		174	
Total	449		268		361		72		29		1179	

From the above data, it can be seen that compared with White families, Native families were at a disadvantage with regard to the ease of obtaining and maintaining satisfactory hygiene. It is therefore not too surprising to note from the data of Table 3-50 that only about 32 percent of Native families had "always clean" houses as compared to 68 percent of White families. Only a small proportion of the families of any ethnic group had an "always dirty" home.

Table 3-50
IS HOUSE CLEAN?

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
CLEAN	N	%	N	%	N	%	N	%	N	%	N	%
Always Clean	126	31.7	69	32.5	184	67.6	31	56.4	8	42.1	418	43.8
Occas. Dirty	168	42.3	108	50.9	83	30.5	19	34.5	10	52.6	388	40.6
Often Dirty	80	20.2	22	10.4	5	1.8	4	7.3	--	--	111	11.6
Always Dirty	23	5.8	13	6.1	--	--	1	1.8	1	5.3	38	4.0
No Data	52		56		89		17		10		224	
Total	449		268		361		72		29		1179	

SOCIO ECONOMIC STATUS

Data describing the employment or occupation of the father and mother, the family income and sources of income, give some insight into the economic situation surrounding the residents of the NWT. Tables 3-51 and 3-52 describe the employment situation for the father of the study infants.

Table 3-51
FREQUENCY OF FATHER'S EMPLOYMENT

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
WORK	N	%	N	%	N	%	N	%	N	%	N	%
None	32	8.6	31	16.8	--	--	--	--	--	--	63	6.6
Steady	183	49.1	85	45.9	304	98.7	55	88.7	18	90.0	645	68.0
Seasonal	64	17.2	25	13.5	4	1.3	6	9.7	1	5.0	100	10.5
Odd Job	94	25.2	44	23.8	--	--	1	1.6	1	5.0	140	14.8
No Data	76		83		53		10		9		231	
Total	449		268		361		72		29		1179	

Table 3-52
FATHER - MONTHS EMPLOYED PAST YEAR

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	8.6	9.1	11.7	10.8	11.2
S.D.	3.9	3.95	1.2	2.4	1.8
Median	10.7	11.6	11.96	11.8	11.3
Total	296	132	302	59	20

Virtually all the fathers of White infants were steadily employed, whereas less than 50 percent of the Inuit and Indian fathers were so engaged. Occasional odd jobs accounted for the second largest proportions of employment for the Inuit and Indian fathers. Almost 17 percent of Indian fathers and 8 percent of Inuit fathers were not employed. Of the fathers who did work in the study year, the average number of months employed varied from 8.6 for Inuit fathers to 11.7 for White fathers.

The nature of the fathers occupation is outlined in Tables 3-53 to 3-55 which show that the majority of Native fathers were employed in hunting - trapping, semi- skilled or skilled manual labour whereas the White father was more occupied in small businesses, other white collar work or skilled manual labour jobs; jobs which are much less dependent on the vagaries of weather and season and more likely to provide a steady income.

Table 3-53
FATHER'S TYPE OF OCCUPATION

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
OCCUPATION	N	%	N	%	N	%	N	%	N	%	N	%
Hunter Trapper	122	34.9	61	34.9	--	--	2	3.6	--	--	185	20.6
Casual Labour	5	1.4	--	--	1	0.3	1	1.8	--	--	7	0.8
Semi Skilled	133	38.0	55	31.4	22	7.4	8	14.3	3	16.7	221	24.6
Skilled Manual Labour	55	15.7	38	21.7	104	34.9	24	42.9	12	66.7	233	26.0
Unskilled	22	6.3	4	2.3	39	13.1	15	26.8	2	11.1	82	9.1
Skilled White Collar	4	1.1	4	2.3	70	23.5	4	7.1	1	5.6	83	9.3
Proprietor Small Business	1	0.3	7	4.0	53	17.8	2	3.6	--	--	63	7.0
Proprietor Large Business	--	--	1	0.6	9	3.0	--	--	--	--	10	1.1
Retired or Unable	6	1.7	4	2.3	--	--	--	--	--	--	10	1.1
Deceased	2	0.6	2	1.1	--	--	--	--	--	--	4	0.4
No Data	99		93		63		16		11		282	
Total	449		268		361		72		29		1179	

Table 3-54
FATHER'S HANDICRAFT PRODUCTION

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
CRAFTS	N	%	N	%	N	%	N	%	N	%	N	%
Full Time	11	3.0	--	--	2	0.7	--	--	--	--	13	1.4
Part Time	104	28.3	15	8.9	3	1.0	3	4.8	2	9.5	127	13.8
None	253	68.8	153	91.1	297	98.3	59	95.2	19	90.5	781	84.8
No Data	81		100		59		10		8		258	
Total	449		268		361		72		29		1179	

Table 3-55
FATHER ENGAGED IN HUNTING AND FISHING

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Year Round	105	28.2	30	16.5	4	1.3	3	4.9	1	4.8	143	15.2
Part Time	210	56.3	86	47.3	19	6.3	15	24.6	6	28.6	336	35.8
None	58	15.5	66	36.3	279	92.4	43	70.5	14	66.7	460	49.0
No Data	76		86		59		11		8		240	
Total	449		268		361		72		29		1179	

Few fathers of any ethnic group were occupied in Native handicrafts and for those who were, predominantly Inuit, it was on a part time basis.

Almost 70 percent of Native mothers were occupied in the production of handicrafts whereas few White mothers were so involved (Table 3-56).

Table 3-56
MOTHER'S WORK WITH NATIVE CRAFTS

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
None	82	20.6	66	30.6	280	91.8	32	51.6	12	57.1	472	47.0
Little	178	44.6	103	47.7	25	8.2	27	43.5	5	23.8	338	33.7
Much	139	34.8	47	21.8	--	--	3	4.8	4	19.0	193	19.2
No Data	50		52		56		10		8		176	
Total	449		268		361		72		29		1179	

Thirty-five percent of Inuit mothers and 22 percent of Indian mothers used a large portion of their time in this way. Much of the work appeared to have been done at home since, as Table 3-57 shows, 70 percent of mothers did not work outside of the home and of those who did, about one-half did so on a part time basis only.

Table 3-57
WORK BY MOTHER OUTSIDE THE HOME

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
None	236	70.0	148	73.6	199	71.8	36	63.2	15	75.0	634	71.1
Part Time	59	17.5	27	13.4	37	13.4	5	8.8	2	10.0	130	14.6
Full Time	42	12.5	26	12.9	41	14.8	16	28.1	3	15.0	128	14.3
No Data	112		67		84		15		9		287	
Total	449		268		361		72		29		1179	

On the whole, mothers were better educated than fathers. This was especially so for the Inuit and Indian mothers where 52 percent of the Inuit fathers and 28 percent of the Indian fathers had no education compared to the 37 percent and 9 percent respectively of the mothers. This may reflect the older age of the native male and greater tendency to keep future hunters out of school. For those that did attend school, the Inuit, Indian, and White mothers and fathers attended for similar periods of time, whereas with the Mixed group the fathers had attended for longer. These data are summarized in Tables 3-58 and 3-59.

Table 3-58
MOTHER - YEARS OF FORMAL SCHOOLING

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	5.9	7.6	12.2	8.95	10.8
S.D.	2.9	3.1	2.1	2.7	2.1
Median	5.8	7.5	11.99	9.1	11.1
Total	239	192	306	60	23

Table 3-59
FATHER - YEARS OF EDUCATION (IF EVER AT SCHOOL)

	INUIT	INDIAN	WHITE	MIXED	OTHER
Mean	5.9	7.9	12.8	11.0	10.5
S.D.	3.3	4.2	2.8	2.8	1.9
Median	5.2	7.8	12.3	11.5	10.8
Total	166	128	303	53	19

Data summarized in Tables 3-60 to 3-64 show that almost 65 percent of families of Inuit and Indian infants had a cash income of less than $6000, whereas 68 percent of families of White infants had a cash income of more than $10000.

Table 3-60
TOTAL FAMILY INCOME

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
INCOME	N	%	N	%	N	%	N	%	N	%	N	%
<$2000	104	33.4	69	41.6	2	0.7	2	4.2	1	5.0	178	21.2
2001-6000	96	21.4	39	14.5	10	2.8	3	6.3	3	10.3	151	18.0
6001-10000	75	16.7	33	12.4	55	15.3	13	27.1	6	20.7	182	21.7
10001-15000	26	5.8	20	7.4	131	36.2	21	43.8	6	20.7	204	24.3
15001 plus	10	2.2	5	1.8	97	27.0	9	18.8	4	13.8	125	14.9
No Data	138		102		66		24		9		339	
Total	449		268		361		72		29		1179	

Table 3-61
INCOME FROM FURS

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
FURS	N	%	N	%	N	%	N	%	N	%	N	%
Yes	206	64.2	38	23.0	1	0.4	5	10.0	1	7.1	251	30.9
No	115	35.8	127	77.0	260	99.6	45	90.0	13	92.9	560	69.1
No Data	128		103		100		22		15		368	
Total	449		268		361		72		29		1179	

Table 3-62
INCOME FROM WELFARE

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
WELFARE	N	%	N	%	N	%	N	%	N	%	N	%
Yes	133	42.1	95	52.5	3	1.1	1	2.0	3	18.8	235	28.5
No	183	57.9	86	47.5	258	98.9	50	98.0	13	81.3	590	71.5
No Data	133		87		100		21		13		354	
Total	449		268		361		72		29		1179	

Table 3-63
INCOME FROM UNEMPLOYMENT INSURANCE OR PENSION

UI INS/	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
PENSION	N	%	N	%	N	%	N	%	N	%	N	%
Yes	22	7.4	10	6.0	28	10.7	3	6.1	3	18.8	66	8.3
No	275	92.6	158	94.0	233	89.3	46	93.9	13	81.3	725	91.7
No Data	152		100		100		23		13		388	
Total	449		268		361		72		29		1179	

Table 3-64
INCOME FROM OTHER SOURCES

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
OTHER	N	%	N	%	N	%	N	%	N	%	N	%
Yes	118	37.6	49	28.8	46	17.4	8	16.3	9	56.3	230	28.3
No	196	62.4	121	71.2	218	82.6	41	83.7	7	43.8	583	71.7
No Data	135		98		97		23		13		366	
Total	449		268		361		72		29		1179	

The use of natural or "Native" food was another source of income. Although this was not measured in terms of dollars it in fact provided a suitable alternative to money. It must be realized that only 21 percent of Inuit and 41 percent of Indian claimed to rely predominently on store bought food, versus 95 percent of the Whites (Table 7-29 chapter 7), thus reducing substantially the cost of living for most Native families. Almost 50 percent of the two major Native groups received welfare at some time. Less than 2 percent of the White and Mixed groups did so. Furs were another common source of income for the Inuit and Indian families - less so for the Mixed and Other groups and a wholly absent source for the White families. Other sources, such as handicrafts, were a common source for all the ethnic groups including, surprisingly, the Whites. Unemployment Insurance and/or pensions were another income source - but one not commonly available in any group.

Even though the income differentials appear to be great, one necessity of life - a suitable mode of transportation - appeared to be within the reach of nearly everyone (Table 3-65).

Table 3-65
OWNERSHIP OF TRANSPORT

TRANSPORT	INUIT N	INUIT %	INDIAN N	INDIAN %	WHITE N	WHITE %	MIXED N	MIXED %	OTHER N	OTHER %
1 Vehicle	154	42.4	51	28.9	206	70.8	31	53.4	12	60
2 Vehicles	163	44.9	75	42.6	41	14.1	10	17.2	6	30
3 Vehicles	16	4.4	8	4.5	14	4.8	6	10.3	1	5
Dogs	1	0.3	21	11.9	0		1	1.7	0	
Dogs & Vehicle*	26	7.2	53	30.1	3	1.0	5	8.6	1	5
None	29	7.9	21	11.9	30	10.3	10	17.2	2	10
No Data	86		92		70		14		8	

* These may be included in the 2 and 3 vehicle groups also.

With the exception of the Mixed group, the families of 90 percent of the infants had at least one source of transportation - many had two.

ALCOHOL CONSUMPTION PATTERNS

Alcohol consumption was, and is, a common problem in the North - a problem associated with violence, poverty, family breakdown, and, as will be shown elsewhere in this study, with ill health and death. For these reasons, information was obtained about the consumption of alcohol by the parents of the study infants. It must be cautioned that some of these data are based on subjective judgments.

Tables 3-66 to 3-71 summarize the available data and suggest that alcohol consumption was common among all groups, but least so among the Inuit with nearly 60 percent of women and 36 percent of men not drinking at all.

Table 3-66
ALCOHOL CONSUMPTION OF MOTHER

ALCOHOL	INUIT N	INUIT %	INDIAN N	INDIAN %	WHITE N	WHITE %	MIXED N	MIXED %	OTHER N	OTHER %	TOTAL N	TOTAL %
Never Drinks	231	59.5	53	25.5	56	22.6	14	26.4	5	25.0	359	39.1
Never Intox.	57	14.7	68	32.7	165	66.5	24	45.3	13	6.5	327	35.7
Occas Intox.	80	20.6	68	32.7	27	10.9	15	28.3	2	1.0	192	20.9
Often Intox.	20	5.2	19	9.1	--	--	--	--	-	--	39	4.3
No Data	61		60		113		19		9		262	
Total	449		268		361		72		29		1179	

Table 3-67
ALCOHOL CONSUMPTION OF FATHER

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
ALCOHOL	N	%	N	%	N	%	N	%	N	%	N	%
Never Drinks	131	36.2	16	9.5	40	16.2	8	15.7	5	27.8	200	23.6
Never Intox.	69	19.1	57	33.9	147	59.5	18	35.3	8	44.4	299	35.3
Occas Intox.	134	37.0	66	39.3	57	23.1	22	43.1	5	17.2	284	33.6
Often Intox.	28	7.7	29	17.3	3	1.2	3	5.9	-----		63	7.4
No Data	87		100		114		21		11		333	
Total	449		268		361		72		29		1179	

Table 3-68
MOTHER VIOLENT WHEN DRUNK

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
VIOLENCE	N	%	N	%	N	%	N	%	N	%	N	%
Yes	7	5.7	18	15.3	-------		1	3.2	-------		26	3.0
No	116	94.3	120	87.0	184	100	30	96.8	15	100	465	94.7
N/A[1]	239		51		61		16		5		372	
No Data	87		79		116		25		9		316	
Total	449		268		361		72		29		1179	

[1] N/A=Not Applicable

Table 3-69
FATHER VIOLENT WHEN DRUNK

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
VIOLENCE	N	%	N	%	N	%	N	%	N	%	N	%
Yes	28	14.5	31	22.3	2	1.0	4	11.1	--	--	65	11.4
No	165	85.5	108	77.7	189	99.0	32	88.9	11	100	505	88.6
N/A[1]	137		17		47		10		5		216	
No Data	119		112		123		26		13		393	
Total	449		268		361		72		29		1179	

[1] N/A=Not Applicable

Table 3-70
MOTHER - DETENTIONS FOR DRINKING

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
None	370	97.4	189	95.9	246	100.	48	98.0	20	100.	873	97.8
1+	10	2.1	8	4.0	--	--	1	2.0	--	--	19	2.1
No Data	69		71		115		23		9		287	
Total	449		268		361		72		29		1179	

Table 3-71
FATHER - DETENTIONS FOR DRINKING

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
None	324	93.6	147	89.6	240	100.	46	97.9	15	100.	772	95.1
1+	22	6.5	17	10.4	--	--	1	2.1	--	--	40	4.9
No Data	103		104		121		25		14		367	
Total	449		268		361		72		29		1179	

In every instance, women tended to drink less and become drunk or violent less often than did the men. The majority of White, Mixed and Other groups, while drinking, did not become intoxicated. This is in contrast to the Native groups where alcohol consumption was not uncommonly associated with intoxication.

Violence when drunk was uncommon among women, but significantly more common among men with 14.5 percent of Inuit males and nearly 22 percent of Indian males reported as being violent when drunk. Among all groups, detentions for drinking were uncommon, but less so for Native men.

These data support the contention that alcohol consumption was a significant problem in the families of this study.

SUMMARY AND CONCLUSIONS

This chapter has described the socio-economic environment of the infants of this study and their families. For purposes of analysis, the ethnic groups have been divided into 5 groups; 3 large: Inuit, White and Indian and 2 small: Mixed and Other. Although this classification is not the same as the official federal classification commonly used in the North, it is felt that it more accurately reflects the socio-cultural environment.

The data presented paint a picture of three, different, major ethnic groups. Because of their small populations the Mixed and Other groups are harder to describe; however, they seem to be similar in most respects to the White group.

Using these groupings, various demographic data have been presented. Inuit and Indian infants tended to live in smaller settlements, whereas White infants more commonly were in larger settlements. Access to medical facilities was very good for virtually all infants although, for 28 percent of Inuit infants, there might be a wait of over 13 hours from the onset of illness to seeing a physician for definitive care.

From a demographic point of view, the Native infants had older fathers, and mothers who were more likely than were White mothers to be at the extremes of age and to be single. They were often born into large families living in crowded homes with facilities considered relatively primitive by "Southern" standards. Few Native families had flush toilets or "running water" or even a bathtub - yet nearly all the families of White infants had these amenities.

Nearly 16 percent of Inuit infants and 6 percent of Indian infants, but only one percent of White infants, were adopted out at birth. Among the two Native groups, the child was often adopted to a relative. Child care for all these groups was generally good. Inuit infants were more likely to be raised in a traditional manner than were Indian infants. It is probable that this is a reflection of the relative isolation in which many Inuit families live.

The economic position of the families of these ethnic groups show marked disparities especially between the White and the two Native groups. Most White fathers had full time employment and relatively high wages. Less than 50 percent of Inuit and Indian fathers had full time employment and cash income was much less, although this was replaced in part by meeting the needs of daily life from hunting and trapping. Almost 50 percent of Indian and Inuit groups received welfare at some time compared to 2 percent of the White group.

Alcohol consumption was common in all groups and the data suggest that it was a significant social problem in many of the families of this study. Further data to be presented in the following chapters will show alcohol to be an important factor in influencing the health of infants.

In conclusion, the data of this chapter show that the White infant lived in a micro-environment very similar to that of his Southern counterparts, whereas the Inuit and Indian infant lived in a micro-environment which was, for the most part, not similar to his traditional environment and not the same as the White infant; rather it was something in between. Their parents were long term residents of the NWT, yet they were being faced with adapting to the mores and institutions of Southern Canada. It will be shown later in this study that one of the determinants of infant health is the degree to which Native parents have successfully or unsuccessfully adapted to these new ways, and the degree to which they have been able to retain certain traditional practices beneficial to the infant.

CHAPTER 4

PREGNANCY, LABOUR, AND THE NEWBORN

by D.W. Spady and R.J. Ostolosky

INTRODUCTION

In discussing the events occurring during the first year of life of the infants of this study it seems only reasonable to begin with the circumstances surrounding their gestation and birth, for these events may be a major influence in determining the future course of their life.

Before presenting the results in this chapter, certain prefatory comments are necessary. Data have been collected in many ways, by many people, from people with varying conceptions of time and place, health and illness, accuracy and numbers. Data such as maternal medical and pregnancy history are especially suspect; abortions may have been forgotten, even infants who have died may not be remembered by the mother, especially if she has lost many infants over the years. Equally suspect may be data relating to the present pregnancy; for example, the dates of the last menstrual period or of quickening are notoriously difficult to pinpoint accurately. To the degree that the pregnancy has been monitored by medical personnel, the data should be more representative of the true situation, but it must be remembered that because of individual differences in knowledge, technique and facility, data collected by professionals are not necessarily accurate. One can only hope that errors introduced here are random and tend to cancel each other.

For the above reasons, the following statistics will be presented only to the extent that the committee feels them reasonably representative of the true situation or where, even though suspect, they point to a potentially serious situation that requires comment.

There were 1191 births, 24 of which were twins, hence there were 1179 pregnancies; therefore, when discussing data about the mother and gestation the data will consider each pregnancy; when discussing the events of parturition and the newborn the data will consider each infant. Unlike most of the other chapters in this report, the data are subdivided by the ethnic origin of the mother, rather than the infant; the reason for this is that the events of pregnancy relate more to the mother and her environment than to the infant. The ethnic subdivisions are largely self explanatory with the exception of the term "Other" which, for all intents and purposes, means "Metis" - or of mixed Indian/White origin. Table 4-1 presents basic statistics regarding the composition of the study groups.

Table 4-1
ETHNIC GROUPING OF MOTHER

	INUIT	INDIAN	WHITE	OTHER	TOTAL
Singleton Pregnancies	468	214	391	94	1167
Twin Pregnancies	5	1	6	0	12
Total	473	215	397	94	1179

The largest group are the Inuit, constituting 40 percent of all mothers, followed by White (34%) Indian (18%) and Others (8%).

THE PREGNANCY

INFORMATION ABOUT THE MOTHER

Data describing parity were available on all except 6 mothers; of the remainder 362 were primigravid, and 811 were multigravid of whom 281 had 5 or more pregnancies. Table 4-2 presents data describing gravidity.

Table 4-2
NUMBER OF KNOWN PREGNANCIES INCLUDING PRESENT PREGNANCY

	INUIT	INDIAN	WHITE	OTHER	TOTAL
Mean	4.33	3.72	2.10	3.13	
Standard Deviation	3.26	2.99	1.31	2.74	
Median	3.41	3.82	1.81	2.30	
Total	470	213	396	94	1173
% Primip*	23.4%	28.6%	41.3%	29.8%	
% >5 Preg.	39.2	29.2	4.5	16.1	
Range	1 - 19	1 - 18	1 - 9	1 - 14	

No data = 6
* Primip=Primiperous

The parity, or number of known viable births, is presented in Table 4-3.

Table 4-3
NUMBER OF KNOWN VIABLE BIRTHS NOT INCLUDING PRESENT PREGNANCY

	INUIT	INDIAN	WHITE	OTHER	TOTAL
Mean	2.95	2.52	0.885	1.92	
Standard Deviation	2.98	2.82	1.08	2.49	
Median	1.99	1.70	0.66	1.19	
Total	470	212	396	94	1172
Range	0 - 15	0 - 16	0 - 7	0 - 12	

No data = 7

Native mothers have higher gravidity and parity than do White mothers. A very large proportion (16% to 39%) of Native mothers have 5 or more pregnancies. These two observations, combined with the common finding that grand multiparity is associated with an increased incidence of maternal and fetal morbidity and mortality, (Butler and Bonham, 1963), point to the high risk that many Native mothers take when they become pregnant.

Maternal age is shown in Table 4-4. Of the 93 mothers less than seventeen years of age (an age below which girls are at greater biological and psychological risk (National Academy of Sciences, 1970)), 81 (87.1%) were non-White; of the 95 mothers 35 years and older (an age above which reproductive risk becomes significant), 81 (85%) were non-White. Thus, it is apparent that the majority of pregnancies occurring at the extremes of the child bearing years were to non-White mothers.

Table 4-4
MATERNAL AGE

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
AGE	N	%	N	%	N	%	N	%	N	%
<17	51	10.8	21	9.8	12	3.0	9	9.6	93	7.9
18-19	62	13.1	24	11.1	33	8.3	13	13.8	132	11.2
20-24	155	32.8	80	37.2	149	37.5	35	37.2	419	35.5
25-29	87	18.4	39	18.1	144	36.3	21	22.3	291	24.7
30-34	66	13.9	29	13.5	45	11.3	8	8.5	148	12.6
35-39	40	8.5	14	6.5	12	3.0	6	6.4	72	6.1
40-44	8	1.7	8	3.7	2	0.5	2	2.1	20	1.7
45+	3	0.6	-	-	-	-	-	-	3	.25
Total	472		215		397		94		1178	

No Data = 1

Data in Tables 4-5 and 4-6 describe the height and weight of the mothers.

Table 4-5
USUAL HEIGHT OF MOTHERS (cm)

	INUIT (E)	INDIAN(I)	WHITE(W)	OTHERS(O)
Mean	152.8	156.3	160.3	157.9
Standard Deviation	6.1	5.3	7.0	4.9
Median	152.5	154.9	160.2	157.8
Total	408	157	325	67
%ht<152 cm	50%	29.9	25.4	20.9

Anova with Scheffe's Contrast Test
Groups E<I,O <W $p<0.05$
No data = 229

Table 4-6
USUAL WEIGHT OF MOTHERS (kg)

	INUIT	INDIAN	WHITE	OTHERS	TOTAL
Mean	55.16	55.72	57.70	58.1	
Standard Deviation	8.0	8.2	8.3	9.3	
Median	53.6	53.9	56.16	53.9	
Total	303	145	334	72	854
%<45 kg	3.6%	3.4%	2.9%	--	
%>90 kg	0.3%	0.7%	0.6%	1.4%	

No data = 325

There were 229 cases with height not recorded and 325 cases with usual weight not recorded. The differences between the heights were compared using one way analysis of variance and Scheffe's Contrast tests and are statistically significant ($p<0.05$) with the Inuit being the shortest, the Indian and Other groups forming an intermediate group and the Whites tallest. The degree to which these differences reflect genetic rather than nutritional or other environmental influences is difficult to determine; however, the fact that a secular trend exists for these populations (Schaefer, 1970; Rode and Shephard, 1976; Skrobak-Kaczynski and Lewin, 1976) would suggest that the difference is not totally genetic. Native mothers generally weighed less than White mothers, but the differences are not as striking as for height.

The events occurring in a mother's life prior to pregnancy can have a definite influence on the developing fetus and infant. A mother who has been severely malnourished as a child may well have a smaller infant than the mother who is well nourished throughout life. A mother who is chronically ill or who has had severe tuberculosis or chronic renal disease may compromise herself and her fetus when she becomes pregnant. For these reasons, it was felt necessary to document the mother's past medical history. During analysis of the collected data it became obvious that for various reasons the data were suspect and incomplete, therefore, details of the mother's past history will not be presented except to comment on two observations: (a) the total number of morbidity episodes[1] including tuberculosis, and (b) the separate incidence of tuberculosis. These are summarized in Table 4-7.

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[1] A morbidity episode, for the purposes of this discussion, refers to an episode of illness of a severity that the mother remembered it, or it was recorded on her medical chart. Very clearly, it is a crude measure.

Table 4-7
PAST MEDICAL HISTORY OF MOTHER

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	Rate*	N	Rate*	N	Rate*	N	Rate*	N	Rate*
Overall Morbidity Episodes Recorded	457	966	159	739.5	159	400.5	42	447	817	693
Tuberculosis	142	300	48	223	2	5.04	3	31.9	195	165.4

$$*\text{Rate} = \frac{\text{Number of episodes of event occurring}}{\text{Number of individuals in ethnic group}} \times 1000$$

The total number of medical episodes reflects, in a very gross manner, the relative morbidity among the four groups. It must be remembered that the numbers presented reflect almost certainly an underestimate of the true situation; even so, it is clear that the Native groups had a higher incidence of illness than did the White mother - almost two times as high. In both Inuit and Indian groups, tuberculosis constituted approximately 30 percent of all recorded episodes as compared to about 0.4 percent of illnesses of White mothers being due to tuberculosis.

The previous obstetrical history is another indirect indicator of possible problems occurring in the present pregnancy. This history was available in all but 84 mothers; however, the data are questionable as they likely underestimate the true situation, especially with respect to the Indian mother. Table 4-8 presents pertinent aspects of this data and illustrates the marked discrepancy in frequency of stillbirth and neonatal death between Natives and White mothers.

Table 4-8
PREVIOUS OBSTETRICAL HISTORY

	INUIT N=433		INDIAN N=194		WHITE N=389		Other N=79	
	N	%	N	%	N	%	N	%
One or More Stillbirths	26	6.0	3	1.6	9	2.3	3	3.8
One or More Neonatal Deaths	42	9.7	7	3.6	4	1.0	1	1.3

No data = 84

Marital status is an important social factor which may play a role in the eventual outcome of a pregnancy. Table 4-9 shows that the incidence of unwed mothers is highest in the Indian group (36%) and is closely followed by Inuit and Other mothers (23% - 27%), whereas only 6 percent of White mothers were single.

Table 4-9
MARITAL STATUS OF MOTHERS

STATUS	INUIT N	INUIT %	INDIAN N	INDIAN %	WHITE N	WHITE %	OTHER N	OTHER %	TOTAL N	TOTAL %
Single	107	23.1	77	36.	26	6.	25	27.	235	20.1
Married	348	75.1	121	57.	358	92.	55	59.	882	75.6
Widow	5	1.1	1	0.5	--	--	--	--	6	0.5
Divorced	1	0.2	1	0.5	--	--	1	1.	3	0.3
Separated	2	0.4	2	1.	4	1.	2	2.	10	0.9
Commonlaw	10	2.2	11	5.4	4	1.	6	10.	31	2.7
Total	473		213		392		89		1167	
No data = 12										

However accepting we are in socio-cultural terms of these numbers of single women having babies, we must not forget they are at risk, and carry with them a formidable array of perinatal problems requiring special attention (WHO, 1970).

Contraceptive devices were most commonly used by Whites, with only 37 percent not having some form of contraception. Indians and Inuit less commonly used contraceptive devices. In all cases the most common method was the use of oral contraceptives. (Table 4-10)

Table 4-10
CONTRACEPTION DEVICE USAGE

BIRTH CONTROL	INUIT N	INUIT %	INDIAN N	INDIAN %	WHITE N	WHITE %	OTHER N	OTHER %	TOTAL N	TOTAL %
None	240	57.9	129	74.1	115	37.5	36	51.4	520	53.9
Oral Cont.	140	33.8	32	18.4	165	53.7	26	37.1	363	37.6
I.U.D.	29	7.0	10	5.7	10	3.3	5	7.1	54	5.6
Other or Combined	5	1.2	3	1.7	17	5.5	3	4.3	28	2.9
Total	414		174		307		70		965	
No Data	59(12.5)		41(19.1)		90(22.7)		24(25.5)		214(18.2)	

PRENATAL CARE

The single most important advance in the prevention of obstetric tragedy has been the aggressive introduction of regular prenatal care to all pregnant mothers. Prenatal care provides the medical practitioner with the opportunity to assess the health of the mother and her unborn child; it provides an opportunity to detect potential problems, to treat the simple ones and to modify or prevent most of the serious problems. To be successful, it requires the cooperation of the mother from early pregnancy to parturition. In the NWT, the vast majority of mothers lived in communities where there was either a resident nurse or doctor and hence facilities for prenatal care were readily available.

In common "Southern" practice a mother may be seen by a physician for prenatal care once a month from the third to eighth month, then bi-weekly for a month, and then once weekly till delivery; approximately 13 times. Where medical care is available five visits or less would be considered to be an inadequate number of prenatal visits (PNV). Table 4-11 shows that the average number of visits was greater than five in all groups; only 4.5 percent of mothers had no prenatal visits.

Table 4-11
FREQUENCY OF PRENATAL VISITS

	INUIT	INDIAN	WHITE	OTHER	OVERALL
Mean	8.48	5.34	7.90	5.51	7.48
Standard Deviation	4.65	3.75	3.54	3.54	4.24
Median	8.64	4.94	8.24	5.41	7.56
Total	473	215	397	94	1179
No visits	18	15	12	9	54

The Inuit mother attended an average of 8.5 times, the White mother 7.9; however, the median number of visits was only 4.94 for Indians and 5.41 for Others - suggesting that these two groups are not utilizing the available facilities as well as the Inuit and White mothers.

For 1090 mothers, information was available describing duration of gestation at birth and number of prenatal visits. Table 4-12 is a contingency table presenting this data.

Table 4-12
PRENATAL VISITS COMPARED WITH GESTATION

	GESTATION IN WEEKS									
NUMBER OF	<28		29 - 36		37 - 38		39+		TOTAL	
PRENATAL VISITS	N	%	N	%	N	%	N	%	N	%
<5	6	100	49	49.5	46	27.5	226	27.6	327	30.9
6 - 10	0	0	36	36.4	96	57.5	368	45.0	500	47.2
11+	0	0	14	14.1	25	14.9	224	27.4	263	24.8
TOTAL	6		99		167		818		1090	
No data 89										

Only six mothers had recorded gestations of <28 weeks, all of these had five or less PNV's; perhaps a not unreasonable expectation. Between 29 and 36 weeks, it is reasonable to expect the mother to have had at least five visits, yet 49 out of a total of 99 mothers had fewer than five PNV's. Overall 31 percent of mothers had five or less PNV's, a finding which suggests that more aggressive "recruitment" and follow-up of pregnant mothers is warranted.

Table 4-13
ZONE OF RESIDENCE COMPARED BY FREQUENCY OF PRENATAL VISIT

NUMBER OF	BAFFIN		INUVIK		MACKENZIE		KEEWATIN		TOTAL	
PRENATAL VISITS	N	%	N	%	N	%	N	%	N	%
<5	68	27.6	67	31.2	231	38.9	17	13.6	383	32.5
6 - 10	89	36.2	105	48.8	266	44.9	57	45.6	517	43.9
11+	89	36.2	43	20.0	96	16.2	51	40.8	279	23.6
Total	246		215		593		125		1179	

Table 4-13 shows that 30 - 40 percent of mothers living in Inuvik and Mackenzie had five or less PNV's, whereas Baffin and Keewatin mothers attended more faithfully. If ethnicity is controlled, the place of residence appears to be a factor only in the Indian and Inuit mothers. (Tables 4-14 to 4-17)

Table 4-14
INUIT - ZONE OF RESIDENCE BY PRENATAL VISIT

PRENATAL	BAFFIN		INUVIK		MACKENZIE		KEEWATIN		TOTAL	
VISITS	N	%	N	%	N	%	N	%	N	%
<5	63	28.5	25	47.2	25	29.4	15	13.2	128	27.1
6-10	77	34.8	18	33.9	36	42.3	50	43.9	181	38.3
11+	81	36.7	10	18.9	24	28.2	49	42.9	164	34.7
Total	221		53		85		114		473	

Chi Square = 26.13 p<0.01
No visits = 18

Table 4-15
INDIAN - ZONE OF RESIDENCE BY PRENATAL VISIT

PRENATAL	BAFFIN		INUVIK		MACKENZIE		KEEWATIN		TOTAL	
VISITS	N	%	N	%	N	%	N	%	N	%
<5	--	--	20	28.2	97	67.4	--	--	117	54.4
6-10	--	--	39	54.9	37	25.7	--	--	76	35.4
11+	--	--	12	16.9	10	6.9	--	--	22	10.2
Total	--		71		144		--		215	

Chi Square = 29.96 p<0.01
No visits = 15

Table 4-16
WHITE - ZONE OF RESIDENCE BY PRENATAL VISIT

PRENATAL	BAFFIN		INUVIK		MACKENZIE		KEEWATIN		TOTAL	
VISITS	N	%	N	%	N	%	N	%	N	%
< 5	5	20.0	15	20.8	68	23.5	2	18.2	90	22.7
6-10	12	48.0	40	55.6	162	56.1	7	63.6	221	55.7
11+	8	32.0	17	23.6	59	20.4	2	18.2	86	21.7
Total	25		72		289		11		397	

Chi Square = 2.32 p=>.05
No visits = 12

Table 4-17
OTHER - ZONE OF RESIDENCE BY PRENATAL VISIT

PRENATAL	BAFFIN		INUVIK		MACKENZIE		KEEWATIN		TOTAL	
VISITS	N	%	N	%	N	%	N	%	N	%
<5	--	--	7	36.8	41	55.7	--	--	48	51.1
6-10	--	--	8	42.1	31	41.3	--	--	39	41.5
11+	--	--	4	21.1	3	4.0	--	--	7	7.5
Total	--		19		75		--		94	

Chi Square = 6.87 p=>.05

Among the Indian mothers living in Mackenzie, 67.4 percent had five or less visits, whereas only 28.2 percent of Indian mothers in Inuvik had as few visits. Inuvik Zone was the zone of greatest delinquency among Inuit mothers, with 47.2 percent having the smallest number of visits. Of the Inuit mothers living in Keewatin, only 13.5 percent had five or fewer visits.

Tables 4-18 and 4-19 show that for the Inuit and Indian mothers, the smaller settlements had a greater frequency of PNV's than did the larger settlements.

Table 4-18
INUIT - PRENATAL VISITS COMPARED WITH POPULATION OF MOTHER'S COMMUNITY

NUMBER OF	POPULATION							
VISITS	<500		501-1000		>1000		TOTAL	
	N	%	N	%	N	%	N	%
<5	42	23.6	39	18.4	50	59.5	131	27.7
6 - 10	70	39.3	86	40.8	23	27.4	179	37.8
11+	66	37.1	86	40.8	11	13.1	163	34.5
Total	178		211		84		473	

Chi-Square = 55.2 p<0.01

Table 4-19
INDIAN - PRENATAL VISITS COMPARED WITH POPULATION OF MOTHER'S COMMUNITY

NUMBER OF VISITS	POPULATION <500 N	%	501-1000 N	%	>1000 N	%	TOTAL
<5	26	37.1	20	51.3	70	66.6	116
6-10	33	47.1	14	35.9	29	27.6	76
11+	11	15.7	5	12.8	6	5.7	22
Total	70		39		105		214

No Data=1
Chi Square = 15.72 $p<0.01$

No similar statistically significant relationship existed for the White and Other groups. (Tables 4-20 and 4-21)

Table 4-20
WHITE - PRENATAL VISITS COMPARED WITH POPULATION OF MOTHER'S COMMUNITY

NUMBER OF VISITS	POPULATION <500 N	%	501-1000 N	%	>1000 N	%	TOTAL
<5	5	27.7	6	18.1	84	24.2	95
6-10	13	72.2	19	57.5	186	53.7	218
11+	0	--	8	24.2	76	21.9	84
Total	18		33		346		397

Chi Square = 8.78 $p > .05$

Table 4-21
OTHER - PRENATAL VISITS COMPARED WITH POPULATION OF MOTHER'S COMMUNITY

NUMBER OF VISITS	POPULATION <500 N	%	501-1000 N	%	>1000 N	%	TOTAL
<5	0	--	9	60	39	53.4	48
6-10	4	66.6	3	20	32	43.8	39
11+	2	33.3	3	20	2	2.7	7
Total	6		15		73		94

Chi Square - Not calculated, due to small cell frequencies.

These data suggest that the remoteness of the settlement acts as a factor in PNV attendance. Possibly it is the more constant contact that a medical professional has with the mother in a small settlement that accounts for these statistics; however, they do suggest that in the larger settlements, a more aggressive approach be adopted to follow the prenatal care of mothers.

Prenatal classes were not commonly utilized by mothers in the NWT. Data about prenatal classes were available for 680 mothers of whom only 300 (44.1%) attended at least once (Table 4-22).

Table 4-22
ATTENDANCE AT PRENATAL CLASSES

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
CLASSES	N	%	N	%	N	%	N	%	N	%
Yes	200	54.9	34	29.1	55	33.7	11	30.6	300	44.1
No	164	45.1	83	70.9	108	66.3	25	69.4	380	55.9
Total	364		117		163		36		680	
No Data	109(23.0)[1]		98(45.6)		234(58.9)		58(61.7)		499(42.3)	

[1] The figures in brackets refer to the percentage of total population in each ethnic group.

It was the Inuit mother who was most consistent about attending these classes. However the differences between the groups are not great. One possible reason for the poor record is that, at least in the small settlements, very few mothers would be pregnant at any one time and the nurse could provide most of the necessary information at the prenatal visit.

As mentioned above, the purpose of the prenatal visit was to monitor the course of pregnancy and to optimize the chances of having a healthy newborn. This is done in part by maternal education and in part by recording and intelligently interpreting measurements of the mother's physical status. Certain of these measurements, such as blood grouping, Rhesus factor, height, and serology (i.e. VDRL), need to be measured at least once during the pregnancy. Other factors such as gestation, fundal height, weight, peripheral oedema, blood pressure, and urinary albumen and sugar should be measured at every visit. Tables 4-23, 4-24, 4-25, and 4-26 summarize findings related to the above measurements.

Table 4-23
LABORATORY SEROLOGY (VDRL)

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
STATUS	N	%	N	%	N	%	N	%	N	%
Negative	208	98.1	118	100	186	98.4	25	100	537	98.7
Positive	4	1.9	--	--	3	1.6	--	--	7	1.3
Total	212		118		189		25		544	
No Data	261(55.2)		97(45.1)		208(52.4)		69(73.4)		635(53.9)	

Table 4-23 shows that overall, 53.9 percent of mothers' records had no data describing their serological status. Blood type and Rhesus factor were more commonly obtained (Tables 4-24 and 4-25) but even here, an appreciable percentage of mothers' records (6.0 to 25.6%) did not have this information; information which in an emergency could be of critical importance. It is possible that the problem lies not with the individual obtaining the blood for typing or serology, but rather with the laboratory performing the analysis and returning the results to the nursing station. The data of this study do not provide an answer.

Table 4-24
BLOOD GROUPING - MOTHER

GROUP	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
A	185	52.6	49	28.0	141	38.3	32	40.0	407	41.7
B	14	4.0	2	1.1	38	10.3	5	6.3	59	6.1
O	145	41.2	123	70.3	177	48.1	41	51.2	486	49.8
AB	8	2.3	1	0.6	12	3.3	2	2.5	23	2.4
Total	352		175		368		80		975	
No Data	121(25.6)		40(18.6)		29(7.3)		14(14.9)		204(17.3)	

Table 4-25
RHESUS FACTOR - MOTHER

RH FACTOR	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Positive	404	99.8	172	98.3	306	82.0	73	90.1	965	92.4
Negative	1	0.2	3	1.7	67	18.0	8	9.9	79	7.6
Total	405		175		373		81		1034	
No Data	68(14.4)		40(18.6)		24(6.0)		13(13.8)		145(12.3)	

Table 4-26 is a bit different in that it records only whether or not a particular item was measured at a prenatal visit. Although it would not be expected that hemoglobin be recorded at every visit, all other parameters in this table should be. One can only assume that if the data are not recorded, the measurement has not been done. Overall, 26.2 percent of parameters which should be recorded regularly were not. The Inuit group appeared to have the most careful supervision with only 23.7 percent of measurements not recorded; the other three groups were all similar with about 30 percent of data not recorded. These results are of concern, since it is through these measurements, recorded and interpreted on a continuing basis for each mother, that the health of the mother and her unborn child is protected.

Table 4-26

PRENATAL VISITS - FREQUENCY OF RECORDING OF MEASUREMENTS

	INUIT		INDIAN		WHITE		OTHER		OVERALL	
Total Visits[1]	4053		1153		3183		518		8907	
	N	%	N	%	N	%	N	%	N	%
Edema										
Recorded	3056	75.4	800	69.4	1983	62.3	339	65.4	6178	69.4
Not Recorded	997	24.6	353	30.6	1200	37.7	179	34.6	2729	30.6
Albumen										
Recorded	3545	87.5	885	76.8	2622	82.4	414	79.9	7466	83.8
Not Recorded	508	12.5	268	23.2	561	17.6	104	20.1	1441	16.2
Sugar										
Recorded	3454	85.2	875	75.9	2607	81.9	407	78.6	7343	82.4
Not Recorded	599	14.8	278	24.1	576	18.1	111	21.4	1564	17.6
Blood Pressure										
Recorded	3753	92.6	980	85.0	2938	92.3	458	88.4	8129	91.3
Not Recorded	300	7.4	173	15.0	245	7.7	60	11.6	778	8.7
Hemoglobin										
Recorded	1684	41.5	446	38.7	941	29.6	198	38.2	3269	36.7
Not Recorded	2369	58.5	707	61.3	2242	70.4	320	61.8	5638	63.3
Gestation										
Recorded	3089	76.2	771	66.9	2096	65.8	284	54.8	6240	70.1
Not Recorded	964	23.8	382	33.1	1087	34.2	234	45.2	2667	29.9
Fundus										
Recorded	3055	75.4	702	60.9	1792	56.3	310	59.8	5859	65.8
Not Recorded	998	24.6	451	39.1	1391	43.7	208	40.2	3048	34.2
Weight										
Recorded	3714	91.6	967	83.9	2937	92.3	459	88.6	8077	90.7
Not Recorded	339	8.4	186	16.1	246	7.7	59	11.4	830	9.3
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx										
Total Possibly										
Recorded	32424		9224		25464		4194		71256	
Total Actually										
Recorded	25050		6426		17916		2869		52561	
Percent	76.3		69.7		70.4		69.2		73.8	
Total Not										
Recorded	7374		2798		7548		1275		18695	
Percent	23.7		30.3		29.6		30.8		26.3	

[1] Total visits refers to the total of all prenatal visits by the particular population group concerned.

An effort was made to detect risk factors which might have a bearing on the course of pregnancy or the delivery. The risk factors used during the study period are presented in Table 4-27 and were felt at the time to be those factors for which special note should have been made in the medical record by the attending professional.

Table 4-27
GUIDELINES FOR RISK FACTORS WHICH SHOULD BE IDENTIFIED IN PREGNANCY, DELIVERY, AND THE NEWBORN

Pregnancy

- primipara
- grand multipara - >6 pregnancy
- age of mother:
    - less than 16 years
    - over 34 years
- obesity
- history of previous pregnancy complications, i.e. bleeding, pre-eclampsia, severe anemia, etc.
- medical factors:
    - diabetes
    - pyelitis - kidney disease
    - history of rheumatic fever or heart disease
    - deformity, i.e. back, hips, limbs, etc.
    - obesity
    - tuberculosis
    - Rh negative mother

Delivery

- previous Caesarian section
- difficult labours, prolonged labours, etc. (also risk to NB).
- previous history of complications of delivery, e.g. retained placenta, post-partum hemmorrhage,
- primipara
- Rh negative mother

Newborn

- primipara
- previous premature deliveries, i.e. under 2500 grams.
- previous post mature infants
- history of congenital malformations of previous infants
- stillbirths
- Rh negative mother

The coders of the data examined the medical record of the mother and, using the factors outlined, noted whether or not the risk factors had actually been identified by the medical personnel. The results are in Table 4-28.

Table 4-28
RISK FACTORS IDENTIFIED BY MEDICAL PERSONNEL

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Not Applic.	28	6.0	11	5.3	32	8.5	8	9.3	79	6.9
Yes	51	10.9	23	11.2	25	6.6	4	4.7	115	10.1
No	386	83.0	172	83.5	321	84.9	74	86.0	941	82.9
Total	465		206		378		86		1135	
No Data	8(1.7)		9(4.2)		19(4.8)		8(8.5)		44(3.7)	

In 79 cases (6.9%) there were no risk factors to be identified. Risk factors present were identified by medical personnel in only 115 cases (10.1 percent), the remaining 941 cases (82.9%) had at least some of these risk factors unidentified. It is apparent that medical personnel attending pregnant women must be made more aware of the problems which may complicate and compromise a pregnancy. A possible way of doing this is by using a check sheet with risk factors outlined; another way is through continuing education.

MATERNAL PROBLEMS DURING PREGNANCY

Non-Obstetric Maternal Illness and Trauma

It is well recognized that prenatal visits offer the physician an excellent opportunity to diagnose and treat concurrent maternal disease. Table 4-29 indicates the number of concurrent episodes of illness which occurred in all groups throughout pregnancy. All groups had an appreciable frequency of illness occurring during pregnancy. Inuit mothers had the highest rate of illness with 719 episodes/1000 mothers. Indians had a rate of 595/1000 and Whites had a rate of 418 while Others had the least frequency with only 287 illnesses/1000 mothers. Comparable rates for normal Southern Canadian mothers are not available.

Table 4-29
CONCURRENT MATERNAL ILLNESS AND TRAUMA

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	Rate*	N	Rate	N	Rate	N	Rate	N	Rate
Ill Defined Conditions	71	150	24	112	50	126	12	128	157	131
Infective and Parasitic	75	159	37	172	31	78	4	43	147	123
Respiratory	70	148	15	69	39	98	2	21	126	105
Genitourinary Disorders	54	114	21	98	27	68	5	53	107	89
Blood Diseases	39	82	19	88	19	48	4	43	81	68
Prophylactic Chemotherapy for T.B.	31	65	12	56	0	--	0	--	43	36
Total	340	719	128	595	166	418	27	287	661	561

$$*\text{Rate} = \frac{\text{Total Number of Episodes}}{\text{Population Size}} \times 1000$$

Rate calculated to nearest whole number.

Obstetric Difficulties

The events of obstetric interest occurring during pregnancy and parturition were coded according to the International Classification of Diseases. The total number of episodes of so-called "complications" for the total group are summarized in Table 4-30.

Table 4-30
FREQUENCY OF COMPLICATIONS DURING PREGNANCY AND PARTURITION

NUMBER OF EPISODES	INUIT N=473		INDIAN N=215		WHITE N=397		OTHERS N=94		TOTAL N=1197	
	N	Rate*	N	Rate	N	Rate	N	Rate	N	Rate
Complications This Pregnancy	513	1084	213	991	346	872	67	713	1139	952
Complications Of Labour	536	1133	228	1060	436	1098	88	936	1288	1076

$$*\text{Rate} = \frac{\text{Total Number of Episodes}}{\text{Population Size}} \times 1000$$

Rate calculated to nearest whole number.

When the material is collated in regard to medical significance of the items coded, it is apparent that a good number of the "complications" were of obstetric interest but carried little or no risk to the mother. There are well over 100 items in the International Classification to cover this area; in view of relatively small number of cases in each category, as would be expected from a small total sample, it was felt that a simple listing of categories with numbers in each would be tedious and difficult to interpret. Therefore, only those items carrying clinical significance were chosen for the following table (4-31) which compares the number of episodes of major complications for the four racial groups. In some categories there is considerable inter-ethnic variation, however there does not seem to be any consistent pattern and the variation may in part reflect the small number of cases in each group.

Table 4-31
MAJOR COMPLICATIONS OF PREGNANCY

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N=473		N=215		N=397		N=94		N=1179	
	N	Rate*	N	Rate	N	Rate	N	Rate	N	Rate
Antepartum Hemorrhage	39	82	19	88	35	88	9	96	103	86
Premature Rupture of Membranes	25	53	11	51	18	45	4	43	58	48
Prolonged Pregnancy	19	40	4	19	24	60	4	43	51	43
Preeclampsia	25	53	5	23	13	33	4	43	47	39
Prolonged Rupture of Membranes	6	13	6	28	12	30	6	64	30	25
Unstable Lie	13	27	1	5	3	8	0	--	17	14
Late Intrauterine Fetal Death	8	17	1	5	1	3	0	--	10	8
Hydramnios	3	6	3	14	1	3	1	11	8	7
Eclampsia	1	2	0	--	0	--	0	--	1	1
Rupture of Pregnant Uterus	1	2	0	--	0	--	0	--	1	1
Total	140	296	50	233	107	270	28	298	326	277

$$\text{*Rate} = \frac{\text{Number of Episodes}}{\text{Population Size}} \times 1000$$

LABOUR

The average duration of gestation was 39.3 weeks, with little variation between groups (Table 4-32).

Table 4-32
LENGTH OF GESTATION IN WEEKS

	INUIT	INDIAN	WHITE	OTHER	TOTAL
Mean	38.8	38.9	39.9	39.4	39.3
S.D.	2.5	2.4	1.6	2.3	2.2
Median	39.5	39.7	40.0	39.9	39.8
Total	433	185	387	85	1090
No Data	40	30	10	9	89

Table 4-33 shows that labour onset was spontaneous in 90 percent of cases. The rate was higher among the Inuit and Indian groups (95%) than among White (81%). The reason for this difference is not readily apparent from the data; one reason may be that near term, more White than Native mothers go to Southern hospitals where they wait until labour begins spontaneously or is induced.

Table 4-33
LABOUR ONSET

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Spontaneous	450	95.3	205	95.4	318	80.9	83	89.2	1057	90.1
Induced	17	3.6	5	2.3	59	15.0	8	8.6	89	7.6
Not Applic.	5	1.1	4	1.9	16	4.1	2	2.2	27	2.3
Total	472		215		393		93		1173	
No Data	1		--		4		1		6	

PLACE OF BIRTH

Overall, in 83.6 percent of cases the place of birth was a hospital; however, there were marked interethnic variations (Table 4-34). Almost 98 percent of White infants were born in hospital, but only about 70 percent of Inuit infants were born there. Generally speaking few infants were born away from either a hospital or nursing station.

Table 4-34
MEDICAL FACILITY USED FOR BIRTH OF INFANT

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
Nursing Station	128	26.8	27	12.5	5	1.2	9	9.6	169	14.2
Hospital	334	69.8	183	84.7	396	98.3	83	88.3	996	83.6
Other	16	3.4	6	2.8	2	0.4	2	2.1	26	2.2
Total	478		216		403		94		1191	

Among the White mothers, nearly 18 percent delivered their infant in a hospital in Southern Canada (i.e. - not in the NWT). This is an expected finding because it was a not uncommon practice for the mother to go South for delivery of the child and, while in some cases this might represent a high risk pregnancy, in other cases it simply represented a choice made by the mother. Only 3.7 percent of Indian mothers and 3.9 percent of Inuit mothers were delivered of their child in a Southern hospital.

Among the infants born in Northern hospitals, 810 or 74.4 percent were born in only five communities: Frobisher Bay (191), Inuvik (169), Yellowknife (248), Hay River (133), and Churchill, Manitoba (69). The latter hospital is administratively a "Southern" hospital but geographically and practically a Northern hospital serving the residents of Keewatin zone. Of the 102 infants born in "Southern" Canada, over half (55%) were born in various Alberta centres. (Not shown in tables).

LABOUR

The duration of labour was less than 12 hours in nearly 75 percent of cases, and only 4.7 percent of mothers had labours of greater than 24 hours (Data not shown in tables). Table 4-35 shows that for each ethnic group the duration of labour was less for multiparas than for primiparas. This observation is in keeping with general knowledge. It is interesting to note that the Inuit primiparous mothers had labours that were shorter by an average of over two hours than for any other ethnic group. The duration of the second stage was also shorter in Inuit primiparas than in the other groups. The significance of these observations is unclear.

Table 4-35
DURATION OF LABOUR

	INUIT		INDIAN		WHITE		OTHER		TOTAL
	PP[1]	MP[2]	PP	MP	PP	MP	PP	MP	
First Stage (Hours)									
Mean	8.9	7.6	11.1	8.5	12.1	8.0	13.7	8.6	
Std. Dev.	6.3	6.8	7.6	7.4	7.5	6.4	12.9	9.6	
Total Cases	85	289	48	123	135	198	21	56	955
No Data	25	74	13	31	29	35	7	10	224
SECOND STAGE (MINUTES)									
Mean	26.2	18.7	31.9	19.3	48.0	23.2	49.9	16.5	
Std. Dev.	19.2	26.4	38.1	20.7	48.6	23.7	46.0	20.6	
Total Cases	85	272	48	117	135	189	21	54	921
No Data	25	91	13	37	29	44	7	12	258

[1] PP=Primipara; [2] MP=Multipara.

Inuit mothers appeared to have faster labours than did mothers of other ethnic groups. Among the White infants 94.5 percent were delivered by a doctor whereas among the Inuit, only 59.7 percent, the Indian, 69.8 percent and among the Other, 78.5 percent were delivered by a doctor (Table 4-36); virtually all the remainder were delivered by nurses or nurse-midwives.

Table 4-36
TYPE PERSON AT DELIVERY

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Doctor	281	59.7	150	69.8	375	94.5	73	78.5	879	74.7
Nurse Midwife	54	11.3	6	2.8	3	0.8	4	4.3	67	5.6
Nurse	124	26.3	56	26.0	19	4.8	16	17.2	215	18.3
Native Midwife	6	1.3	--	--	--	--	--	--	6	0.5
Self	7	1.5	3	1.4	--	--	--	--	10	0.9
Total	472		215		397		93		1177	
No Data	6		1		6		1		14	

The infant was a vertex presentation in 95.7 percent of cases, breech in 2.7 percent and other in 1.8 percent of cases (Table 4-37). These statistics are in keeping with generally available data (Reid et al, 1972).

Table 4-37
POSITION AT DELIVERY

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Vertex	425	95.9	184	94.8	348	95.9	79	94.0	1036	95.6
Breech	11	2.5	5	2.6	10	2.8	3	3.6	29	2.7
Other	7	1.6	5	2.6	5	1.4	2	2.4	19	1.8
Total	443		194		363		84		1084	
No Data	30		21		34		10		95	

Delivery was spontaneous in 87.3 percent of cases and operative in the remainder (Table 4-38).

Table 4-38
TYPE OF DELIVERY

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
DELIVERY	N	%	N	%	N	%	N	%	N	%
Spontaneous	440	93.4	199	92.1	306	77.4	78	84.8	1023	87.1
Operative	31	6.6	17	7.9	92	22.6	14	15.2	154	12.9
Total	471		216		398		92		1177	
No Data	2		--		5		2		4	

More White mothers (22.6%) had operative deliveries than did the mothers of any other ethnic group. Tables 4-39 and 4-40 present details as to the nature of the operative procedure.

Table 4-39
FORCEPS USED

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
FORCEPS	N	%	N	%	N	%	N	%	N	%
Yes	18	3.8	8	3.7	59	15.2	8	9.0	93	8.0
No	453	96.2	206	96.3	329	84.8	81	91.0	1069	92.0
Total	471		214		388		89		1162	
No Data	7		2		15		5		29	

Table 4-40
DELIVERY BY CAESARIAN SECTION

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
C-SECTION	N	%	N	%	N	%	N	%	N	%
Yes	462	97.5	207	95.8	368	92.7	88	95.7	1125	95.3
No	12	2.5	9	4.2	31	7.8	4	4.3	56	4.7
Total	474		216		399		92		1181	
No Data	4		--		4		2		10	

The use of forceps was the most common operative intervention with their use indicated in 75 percent of cases when they were used (Table 4-41).

Table 4-41
REASON FOR USE OF FORCEPS

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Elective	4	22.2	3	37.5	16	27.1	--	--	23	24.7
Indicated	14	77.8	5	62.5	43	72.9	8	100.	70	75.3
Total	18		8		59		8		93	
No Data	7		2		15		5		29	

Caesarian section occurred only in 4.5 percent of cases; a relatively low frequency.

Analgesia was given six hours or less before delivery in nearly 52 percent of cases (Table 4-42). Again the White mothers more commonly received analgesia than mothers of other ethnic groups.

Table 4-42
ANALGESIA SIX HOURS BEFORE DEIVERY

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
ANALGESIA	N	%	N	%	N	%	N	%	N	%
Yes	152	32.7	110	51.4	284	73.6	51	56.7	597	51.7
No	313	67.3	104	48.6	102	26.4	39	43.3	558	48.3
Total	465		214		386		90		1155	
No Data	8		1		11		4		24	

Table 4-43 outlines the frequency of use of analgesia during labour and the medications used.

Table 4-43
ANALGESIC DRUG USE FREQUENCY

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
ANALGESIA	N	%	N	%	N	%	N	%	N	%
Once	146	31.5	106	49.5	283	73.3	50	55.6	585	50.7
Twice	61	13.1	60	28.0	175	45.3	23	25.6	319	27.6
More than Twice	14	3.0	13	6.1	50	13.0	4	4.4	81	7.0
Number	464		214		386		90		1154	
No Data	9		1		11		4		25	

About one half of the mothers required analgesia once, and only a small percentage three times. Again the White mothers more commonly received multiple analgesics than did the mothers of other ethnic groups. The most commonly used agents were Demerol, Phenergan, and Lorfan (Tables 4-44, 4-45, 4-46), although Lorfan was presumably used an an antagonist to Demerol and not as an analgesic per-se.

Table 4-44
FIRST ANALGESIC DRUG USED

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
ANALGESIA	N	%	N	%	N	%	N	%	N	%
Demerol	114	78.1	77	72.6	189	66.8	37	74	417	71.3
Valium	9	6.2	13	12.3	49	17.3	7	14	78	13.3
Phenergan	8	5.5	3	2.8	8	2.8	1	2	20	3.4
Nisentil	3	2.1	2	1.9	9	3.2	1	2	15	2.6
Others	12	8.2	11	10.4	28	9.9	4	8	55	9.4
Total	146		106		283		50		585	

Table 4-45
SECOND ANALGESIC DRUG USED

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
ANALGESIA	N	%	N	%	N	%	N	%	N	%
Phenergan	36	59.0	31	51.7	91	52.0	11	47.8	169	53.0
Demerol	12	19.7	10	16.7	25	14.3	1	4.3	48	15.0
Sparine	6	9.8	8	13.3	13	7.4	5	21.7	32	10.0
Lorfan	2	3.3	5	8.3	13	7.4	2	8.7	22	6.9
Valium	3	4.9	1	1.7	12	6.9	3	13.0	19	6.0
Others	2	3.3	5	8.3	21	12.0	1	4.3	29	9.1
Total	61		60		175		23		319	

Table 4-46

THIRD ANALGESIC DRUG USED

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
ANALGESIA	N	%	N	%	N	%	N	%	N	%
Lorfan	10	71.4	6	46.2	33	66.0	2	50.0	51	63.0
Phenergan	3	21.4	5	38.5	5	10.0	0	--	13	16.0
Demerol	0	--	1	7.7	8	16.0	1	25.0	10	12.3
Others	1	7.1	1	7.7	4	8.0	1	25.0	7	8.6
Total	14		13		50		4		81	

Table 4-47

FREQUENCY AND TYPE OF ANAESTHESIA GIVEN

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
TYPE	N	%	N	%	N	%	N	%	N	%
None	344	76.6	138	65.4	126	32.4	58	65.9	666	58.6
General	14	3.1	9	4.3	38	9.8	6	6.8	67	5.9
Epidural	2	0.4	1	0.5	9	2.3	1	1.1	13	1.1
Local	82	18.3	58	27.5	198	50.9	22	25.0	360	31.7
Other	7	1.6	5	2.4	18	4.6	1	1.1	31	2.7
Total	449		211		389		88		1137	
No Data	24		4		8		6		42	

The frequency of anaesthetic use is outlined in Table 4-47. Slightly over one half of the mothers had some anaesthetic; however inter-ethnic variation was great; over 65 percent of White mothers had some form of anaesthesia compared to only 24 percent of Inuit mothers. Local anaesthetics were most commonly used with general or epidural anaesthesia far less common.

The frequency of episiotomy, which in this report is not considered an operative procedure, is outlined in Table 4-48 which shows that overall 40.7 percent of mothers had an episiotomy performed.

Table 4-48

FREQUENCY OF EPISIOTOMY

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
EPISIOTOMY	N	%	N	%	N	%	N	%	N	%
None	346	76.9	136	66.3	133	34.8	50	59.5	665	59.3
Midline	48	10.7	12	5.9	61	16.0	7	8.3	128	11.4
Medio lateral	56	12.4	57	27.8	188	49.2	27	32.1	328	29.3
Total	450		205		382		84		1121	
No Data	23		10		15		10		58	

Among White mothers 65.8 percent had episiotomies but only 23.1 percent of Inuit mothers had this procedure. Most commonly performed was the mediolateral episiotomy.

Oxytocins appeared to be used routinely during delivery for all groups as in current practice. (Data not shown in tables).

MATERNAL DELIVERY TRAUMA

Maternal delivery trauma of some sort occurred in 28.8 percent of mothers, more so among Inuit mothers (35.3%) and least among Whites (20.3%) (Table 4-49).

Table 4-49
MATERNAL BIRTH TRAUMA

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
TRAUMA	N	%	N	%	N	%	N	%	N	%
None	282	64.6	141	76.6	254	74.7	63	79.7	740	71.2
Minor*	80	18.3	17	11.4	42	12.3	11	13.9	150	14.4
Moderate**	58	13.3	22	9.2	40	11.7	4	5.0	124	11.9
Major***	16	3.6	4	2.2	4	1.2	1	1.3	25	2.4
Total	436		184		340		79		1039	
No Data	42		32		63		15		152	

* Minor trauma defined as either hematoma or 1st degree perineal tear.

** Moderate trauma defined as any one or combination of vaginal tear, 2nd or 3rd degree perineal tear.

*** Major trauma defined as either a cervical tear or 4th degree perineal tear.

Trauma, of all degrees of severity was most common in the Inuit group with nearly 35 percent of mothers having some birth trauma. Blood loss of more than 500 cc occurred in 16 percent of these mothers, as compared to 8.5 percent of White mothers. (Table 4-50)

Table 4-50
BLOOD LOSS AT DELIVERY

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
BLOOD LOSS	N	%	N	%	N	%	N	%	N	%
<500cc	377	84.0	161	82.1	313	91.5	65	84.4	875	82.2
>500cc	72	16.0	35	17.9	29	8.5	12	15.6	189	17.8
Total	449		196		342		77		1064	
No Data	24		19		55		17		115	

The higher frequency of trauma among Inuit mothers is disconcerting. Two factors which may play a role are the person attending at delivery and the frequency of episiotomy. Only 60 percent of Inuit mothers had physicians attending the delivery, however in only 2.8 percent of cases was the delivery unattended by a medical professional; thus virtually all these mothers had trained attendants. It is possible that nurse midwives might be more complete in their reports of maternal trauma and, since nurses delivered most Inuit infants, their reporting might have slightly biased the statistics. Possibly more important is the observation previously made that Inuit mothers had fewer episiotomies than did any other group. Since the episiotomy helps to permit a more controlled birth of the infant, it is felt it would "protect" the mother from an undesirable and unexpected tear. Table 4-51 shows that 189(30.1%) of all mothers who did not have an episiotomy had some degree of trauma compared to 77(21.0%) of all mothers who did have an episiotomy. It was felt that the type of episiotomy performed might have a bearing on the frequency and degree of maternal trauma. Of those mothers having midline episiotomy, 30.1 percent had a second or or third degree tear whereas only 11.3 percent of mothers having a mediolateral episiotomy had as severe a tear.

Table 4-51
NATURE OF EPISIOTOMY AND MATERNAL TRAUMA

TYPE OF TRAUMA	NONE		MIDLINE		MEDIO-LATERAL		TOTAL	
	N	%	N	%	N	%	N	%
No Trauma	439	69.9	68	66.0	222	84.1	729	73.3
Minor	111	17.7	4	3.9	12	4.5	127	12.8
Moderate or Major	78	12.4	31	30.1	30	11.4	139	13.9
Total	628(63.1)		103(10.4)		264(26.5)		995	

No Data = 184 Chi-Square = 59.6 $p<0.001$

The same relationship is seen also among the Inuit and White mothers (Tables 4-52 and 4-53). Small cell frequencies do not permit analysis of the data for the Indian and Other groups (Tables 4-54 and 4-55).

Table 4-52
INUIT - NATURE OF EPISIOTOMY AND MATERNAL TRAUMA

TYPE OF TRAUMA	NONE		MIDLINE		MEDIO-LATERAL		TOTAL	
	N	%	N	%	N	%	N	%
None	229	69.0	22	52.4	28	66.7	279	67.1
Minor	66	19.9	2	4.8	1	2.4	69	16.6
Moderate or Major	37	11.1	18	42.8	13	30.9	68	16.3
Total	332(79.8)		42(10.1)		42(10.1)		416	

No Data = 52 Chi-Square = 41.3 $p<0.001$

Table 4-53
WHITE - NATURE OF EPISIOTOMY AND MATERNAL TRAUMA

TYPE OF TRAUMA	NONE		MIDLINE		MEDIO-LATERAL		TOTAL	
	N	%	N	%	N	%	N	%
None	80	62.0	35	76.1	132	87.4	247	75.8
Minor	24	18.6	2	4.3	8	5.3	34	10.4
Moderate or Major	25	19.4	9	19.6	11	7.3	45	13.8
Total	129	(39.6)	46	(14.1)	151	(46.3)	326	

No Data = 75 Chi-Square = 28.3 $p<0.001$

Table 4-54
INDIAN - NATURE OF EPISIOTOMY AND MATERNAL TRAUMA

TYPE OF TRAUMA	NONE		MIDLINE		MEDIO-LATERAL		TOTAL	
	N	%	N	%	N	%	N	%
None	95	77.9	5	55.6	40	83.3	140	78.2
Minor	13	10.6	0	--	3	6.3	16	8.9
Moderate or Major	14	11.5	4	44.4	5	10.4	23	12.9
Total	122	(68.2)	9	(5.0)	48	(26.8)	179	

No Data = 36

Table 4-55
OTHER - NATURE OF EPISIOTOMY AND MATERNAL TRAUMA

TYPE OF TRAUMA	NONE		MIDLINE		MEDIO-LATERAL		TOTAL	
	N	%	N	%	N	%	N	%
None	35	76.1	6	100	22	95.7	63	84.0
Minor	8	17.4	0	--	0	--	8	10.7
Moderate or Major	3	6.5	0	--	1	4.3	4	5.3
Total	46	(61.3)	6	(8.0)	23	(30.7)	75	

No Data = 19

The medio-lateral episiotomy has the advantage of permitting a large extension before important anatomic structures are compromised; however, it has the disadvantage of being somewhat harder to repair, there is a greater blood loss, and it is more likely to be painful (Eastman and Hellman, 1966). The median or midline episiotomy is easy to repair, faulty healing is rare and blood loss is less than with the mediolateral, however, the chance of extension to a major tear is greater. For these reasons, many authorities recommend mediolateral episiotomy as a routine. If the operator is competent and the facilities for repair of severe tears are readily available, then the choice of type of episiotomy should be left to him. However, if facilities are not totally adequate, such as in a nursing station, or if the operator is not confident of his or her competence to deal with an extended tear, then he should perform a medio-lateral episiotomy.

DIFFICULTIES OF LABOUR AND DELIVERY

Major difficulties occurring during labour and delivery are shown in Table 4-56.

Table 4-56
MAJOR DIFFICULTIES OF LABOUR AND DELIVERY

DIFFICULTY	INUIT N=473 N	INUIT Rate*	INDIAN N=215 N	INDIAN Rate*	WHITE N=397 N	WHITE Rate*	OTHER N=94 N	OTHER Rate*	TOTAL N=1179 N	TOTAL Rate*
Prolonged First Stage	85	179.7	54	251.2	98	246.9	20	212.8	257	218.0
Premature Labour	108	228.3	42	195.3	41	103.3	10	106.3	201	170.5
Post Partum Hemmorrhage	44	93.0	16	74.4	17	42.8	6	63.8	83	70.4
Retained Placenta	37	78.2	4	18.6	16	40.3	4	42.6	61	51.7
Prolonged Second Stage	13	27.5	12	55.8	23	57.9	5	53.2	53	44.9
Cord Around Neck (Without Compression)	24	50.7	5	23.3	15	37.8	1	10.6	45	38.2
Fetal Distress	13	27.5	5	23.3	16	40.3	2	21.3	36	30.5
Persistent Occipito Posterior	8	16.9	4	18.6	16	40.3	5	53.2	33	28.0
Breech	11	23.2	5	23.3	10	25.2	3	31.9	29	24.6
Cord Around Neck (With Compression)	12	25.4	3	13.9	10	25.2	1	10.6	26	22.1
Prolonged Labour (Unspecified)	8	16.9	7	32.6			4	42.6	19	16.1
Stillbirth	10	21.1	1	4.7	2	5.0			13	11.0
Transverse Arrest of Fetal Head	4	8.5	2	9.3	5	12.6	1	10.6	12	10.2
Twins	5	10.6	1	4.7	6	15.1			12	10.2
Disproportion	3	6.3	4	18.6	1	2.5	2	21.3	10	8.5
Prolapsed Cord	5	10.6	2	9.3	2	5.0			9	7.6
Shoulder Presentation	2	4.2	1	4.7			1	10.6	4	3.4
Face Presentation	2	4.2					1	10.6	3	2.5
Brow Presentation	1	2.1	1	4.7					2	1.7
Total	395	814.0	169	781.4	278	695.2	66	702.1	908	759.1

$$*\text{Rate} = \frac{\text{Frequency of Difficulty}}{\text{Size of Sample}} \times 1000$$

Because of the small numbers involved, these statistics should be interpreted cautiously.

Premature labour occurred in about 20 percent of Inuit and Indian mothers, but only in 10 percent of White mothers. Dystocia and mechanical difficulties in rotation and descent of the fetal head were commonest in the Whites, as would be expected by the larger mean head circumference for this group. One possible explanation for the preponderance of third stage difficulties in the Inuit group is the increased frequency of retained placenta among this group (Schaefer, 1960). This is an area for further investigation.

MOTHERS "AT RISK"

At the time of the study and continuing to the present, it was standard Northern Medical Services policy that mothers who had five or more pregnancies or who were outside the range of 17-34 years were routinely transferred from remote settlements to a hospital for delivery. The reasoning behind this policy was that previous epidemiologic studies of pregnancy had shown that these were the mothers most likely to have problems with the pregnancy, at parturition or with the newborn infant. In practical terms this often meant separation of the mother from the rest of her family for periods of up to two or three months. This was a practice frought with a multitude of sociological and health consequences. For years, the Native people in the North have deplored, fought in vain and with frustration, this practice of having young mothers shipped to Yellowknife, Churchill or Frobisher Bay for weeks or even months at a time to await their delivery. During this time, their children sometimes were neglected at home, their husbands took up with someone else, or in some cases they themselves got into trouble with alcohol or veneral disease.

Clearly, the routine transferral of mothers to hospital for delivery is a practice which may disrupt the family. The question arises "To what extent do the medical risks associated with high parity and extreme maternal age outweigh the social risks inherent in transferring a mother away from her family to a hospital for delivery?".

Recently Murdock (1978) reviewed factors associated with high risk pregnancies among Baffin and Keewatin Inuit. He concluded that antepartum factors indicating increased risk of problems were:

a. maternal age;

b. previous stillbirth/neonatal death;

c. previous postpartum hemmorrhage or 3rd stage problems;

d. mothers receiving anti-TB therapy;

e. present pregnancy complicated by antepartum hemmorrhage or prolonged rupture of membranes.

Excessive parity (five+) did not appear to be a determinant factor. Closer examination of the factor of maternal age showed it was the mother less than 16 years who was most likely to have problems, either with herself or her newborn infant. The elderly mother, 35 years or more, was at risk of having problems at labour or delivery for the infant, but not herself.

These thoughts prompted us to examine the role of maternal age and parity in influencing the outcome of the pregnancies reported in this study. This was done using contingency table analysis with maternal age (<16, 17-34, 35+ years) and parity (prim 1-4, 5+) as independent variables and the following as dependent variables:

a. Apgar score at 5 minutes (<7, 8+).

b. Antepartum hemmorrhage (none, <500, >500 cc).

c. Postpartum blood loss (<500 cc, >500 cc).

d. Maternal trauma (absent, present).

e. Complications of labour and delivery (absent, present).

f. Neonatal asphyxia (present, absent).

g. Caesarian section (yes, no).

h. Infections during neonatal period (present, absent).

i. Respiratory disease in neonatal period (present, absent).

j. Trauma in neonatal period (present, absent).

k. Other neonatal conditions (present, absent).

When considering the following conclusions, the reader is advised to remember that at the time of the study the policy being discussed was in effect - thus para 5+ mothers and mothers 35+ years old should have been delivered in hospital. Not withstanding this, the events described by the dependent variables would likely have occurred if mother was delivered in hospital or not - the difference would be in the speed and efficacy of treatment. Thus the conclusions arrived at in this discussion are likely valid even though the population studied was treated according to the policy in question.

All of the comparisons were examined as part of the total population and also by ethnic group. Table 4-57 presents the results and shows only those comparisons where a statistically significant and detrimental relationship existed. Of the 220 possibly significant relationships there were only 22 significant relationships demonstrated and of these, eleven (220 x .05) might have been expected to have occurred by chance alone (when $p<0.05$), thus there is little evidence that excess parity or maternal age per se are valid bases for routine evacuation to a hospital for delivery.

Table 4-57
RELATIONSHIPS OF AGE AND PARITY TO OUTCOME OF PREGNANCY

	AGE		PARITY	
VARIABLE	<16	35+	PRIMIPARA	5+
Antepartum Blood Loss			E, O T	E
Maternal Birth Trauma	T,E,I	I	E	E
Caesarian Section	W	E		
Complic. of Labour/Delivery			W	W
Postpartum Hemmorrhage			O	
Five Minute APGAR		I		
Asphyxia		I		
Neonatal Respiratory Disease				
Neonatal Infections	T			
Neonatal Trauma	I		I	I
Miscellaneous Neonatal Problems		W		

E=Inuit I=Indian W=White O=Other T=Total Population
Letters refer to the ethnicity of the mother in which a significant ($p<0.05$) relationship to an outcome variable has been demonstrated.

When the total population is examined, the higher risk pregnancies appear to be the young and primiparous mothers although even here the evidence is not overwhelming. It is recognized that in many cases the decision to evacuate a mother for elective delivery of her child will not be made on the basis of age and/or parity alone. Other factors such as hemmorrhage, multiple pregnancy, toxemia and illness will act to make the indication for evacuation more definitive. However, it is felt that these results are consistent with the findings of Murdock and suggest that there is no strong argument for routine evacuation of mothers of para 5+ or age over 35 years.

THE NEWBORN

THE APGAR SCORE

Tables 4-58 to 4-77 present information about the newborn infant. The first objective information about the status of the infant at birth is obtained from the Apgar score - which is a subjective but well defined series of observations recorded at one and five minutes, and which assesses the infant's cardiorespiratory function (Apgar, 1953). A score of ten is maximal and suggests a healthy babe; a score of zero is minimal and indicates a critically compromised infant who is dying or is dead. At one minute a score of five or less is indicative of a baby in distress, at five minutes a score of seven or less should be cause for immediate concern. Long term studies have indicated that the one minute score is less useful as a predictor of future health than is the five minute score.

Tables 4-58 and 4-59 show that at one minute of age 12.7 percent of infants had an Apgar score of five or less, but by five minutes only 7.9 percent of infants were still in some distress.

Table 4-58
ONE MINUTE APGAR SCORE

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Five or less	56	12.5	21	10.5	44	11.5	11	12.7	132	11.8
Six or more	391	87.5	179	89.5	340	88.5	76	87.3	986	88.2
Total	447		200		384		87		1118	
No Data	21		15		17		7		60	

Total + No Data = 1178 due to 13 stillbirths.

Table 4-59
FIVE MINUTE APGAR SCORE

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Seven or less	35	7.8	14	7.0	23	6.0	6	7.2	78	6.9
Eight or more	416	92.2	187	93.0	359	94.0	83	92.8	1045	93.1
Total	451		201		382		89		1123	
No Data	17		14		19		5		55	

Total + No Data = 1178 due to 13 stillbirths.

These figures agree reasonably well with the frequency of "asphyxia" as outlined in Table 4-60.

Table 4-60
ASPHYXIA PRESENT

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
No	383	85.1	178	87.7	329	85.7	77	87.5	967	86.0
Yes	67	14.9	25	12.3	55	14.3	11	9.1	158	14.0
Total	450		203		384		88		1125	
No Data	18		12		17		6		53*	

Total + No Data = 1178 due to 13 stillbirths.

It is difficult to interpret these results correctly because different individuals may interpret the Apgar in slightly different ways and "asphyxia" was not clearly defined in the study protocol. It must be remembered that birth attendants may tend to overestimate the Apgar score and hence give the infant a higher score than objective analysis would indicate. These results strongly indicate the need for all medical personnel attending newborns to be well acquainted with resuscitation procedures.

BIRTH WEIGHT

The birth weights of the infants are presented in Table 4-61.

Table 4-61
BIRTH WEIGHT OF INFANT (gm)

	INUIT	INDIAN	WHITE	OTHER	TOTAL
Mean	3186	3187	3318	3327	3242
Standard Deviation	659	645	498	724	615
Median	3220	3232	3320	3340	3260
Total	470	216	400	93	1179
No Data	8	0	3	1	12
N <2500 gm	54(11.5%)	23(10.6%)	16(4.0%)	8(8.6%)	101(8.6%)

The variation between the group means was not great but, by using oneway analysis of variance, it can be shown that the difference between the lightest groups, the Inuit and Indian, and the heaviest groups, the White or Other, is statistically significant ($p<0.01$). Among the Inuit and Indian infants nearly 11 percent were less than 2500 gm whereas only 4 percent of White infants were below this weight. The degree to which these differences are due to genetic or environmental factors is not clear.

FACTORS INFLUENCING BIRTH WEIGHT

An attempt was made using multiple regression analysis to define the extent to which certain independent variables accounted for the variation in birth weights. It was decided to introduce certain sociologically relevant variables into the equation before the more "accountable" biological factors in order to determine the extent to which these social factors influenced birth weight. The independent variables were, in order of introduction:

a. Maternal smoking.

b. Maternal alcohol consumption.

c. Maternal weight gain in pregnancy.

d. Maternal height.

e. Maternal weight.

f. Previous viable births.

g. Maternal age (here a classification was used which subdivided maternal age into (a) less than 17 or over 34 or (b) between these extremes).

h. Infant's sex.

i. Length of gestation.

Initially, multiple regression analysis was performed on the total population, and then within each ethnic group. In all cases, in order to preserve an adequate sample base, pairwise deletion was used. Twins were deleted from the analysis. Tables 4-62, 4-63, 4-64, 4-65, 4-66 summarize the data and demonstrate that from 29.5 to 47.3 percent of the variance seen in birth weight can be accounted for by the independent variables.

Table 4-62

TOTAL POPULATION--FACTORS ACCOUNTING FOR BIRTH WEIGHT

VARIABLE	N	R SQUARE	RSQ CHANGE	SIMPLE R
Mothers Smoking Status	946	0.0540	0.0540	-0.232
Use of Alcohol	926	0.0540	0.0000	-0.031
Weight Gain in Pregnancy	1090	0.1097	0.0557	0.257
Maternal Height	957	0.1166	0.0069	0.134
Prepregnancy Weight	865	0.1241	0.0075	0.099
Parity	1096	0.1444	0.0202	0.070
Maternal Age	1191	0.1481	0.0038	0.087
Infant Sex	1191	0.1481	0.0000	0.027
Length of Gestation	1090	0.3617	0.2136	0.525

Table 4-63

INUIT - FACTORS ACCOUNTING FOR BIRTH WEIGHT

VARIABLE	N	R SQUARE	RSQ CHANGE	SIMPLE R
Mothers Smoking Status	372	0.0378	0.0378	-0.1943
Use of Alcohol	411	0.0386	0.0009	0.0138
Weight Gain in Pregnancy	314	0.0914	0.0528	0.2336
Maternal Height	408	0.0941	0.0027	0.0754
Prepregnancy Weight	307	0.1977	0.1036	0.3260
Parity	433	0.2185	0.0208	0.1752
Maternal Age	478	0.2185	0.0001	0.0155
Infant Sex	478	0.2185	0.0000	0.0815
Length of Gestation	433	0.4731	0.2546	0.6020

Table 4-64
INDIAN - FACTORS ACCOUNTING FOR BIRTH WEIGHT

VARIABLE	N	R SQUARE	RSQ CHANGE	SIMPLE R
Mothers Smoking Status	172	0.0113	0.0113	-0.1061
Use of Alcohol	176	0.0222	0.0110	-0.1321
Weight Gain in Pregnancy	145	0.1576	0.1354	0.3828
Maternal Height	157	0.1580	0.0004	0.0918
Prepregnancy Weight	146	0.2105	0.0526	0.2077
Parity	194	0.2160	0.0055	-0.0302
Maternal Age	216	0.2217	0.0057	0.1097
Infant Sex	216	0.2223	0.0007	0.0221
Length of Gestation	185	0.4156	0.1932	0.5251

Table 4-65
WHITE - FACTORS ACCOUNTING FOR BIRTH WEIGHT

VARIABLE	N	R SQUARE	RSQ CHANGE	SIMPLE R
Mothers Smoking Status	339	0.0967	0.0967	-0.3109
Use of Alcohol	277	0.0967	0.0001	-0.0352
Weight Gain in Pregnancy	315	0.1138	0.0171	0.1673
Maternal Height	325	0.1325	0.0187	0.1378
Prepregnancy Weight	339	0.1340	0.0014	0.0360
Parity	387	0.1396	0.0056	0.0608
Maternal Age	403	0.1471	0.0075	0.1002
Infant Sex	403	0.1487	0.0016	-0.0465
Length of Gestation	387	0.2950	0.1463	0.4057

Table 4-66
OTHER - FACTORS ACCOUNTING FOR BIRTH WEIGHT

VARIABLE	N	R SQUARE	RSQ CHANGE	SIMPLE R
Mothers Smoking Status	63	0.0910	0.0909	-0.3016
Use of Alcohol	62	0.0953	0.0044	-0.1018
Weight Gain in Pregnancy	64	0.1614	0.0661	0.2572
Maternal Height	67	0.2351	0.0737	0.2044
Prepregnancy Weight	73	0.2391	0.0040	0.1243
Parity	82	0.2458	0.0067	0.1354
Maternal Age	94	0.2555	0.0097	0.1488
Infant Sex	94	0.2565	0.0009	0.0957
Length of Gestation	85	0.3701	0.1136	0.3617

In every case length of gestation was the most important predictor variable; an expected finding. Among the social variables smoking accounted for between 1 percent and nearly 10 percent of the variance. It was most evident among White and Other mothers and least among Inuit and Indian mothers. This is presumably because most Indian and Inuit mothers smoked, hence making this a poor predictor variable. Nevertheless, smoking was always negatively and significantly associated with birth weight.

Alcohol consumption did not appear to be an important determinant of birth weight, although for all except Inuit mothers, it was negatively correlated with birth weight.

The weight gain of the mother during pregnancy, and her prepregnant weight were the next most important determinant variables. Among the Inuit and Indian mothers they accounted for 15.6 percent and 18.8 percent of the variance respectively. In the Other mothers these variables accounted for 7.0 percent and among White mothers only 1.9 percent of the variance. These data suggest that the nutritional status of Native mothers was more influential in determining the birth weight of their infants than it was among White mothers. This is not too surprising; however, it does have public health significance.

As was shown in Tables 4-5 and 4-6 the Native mother was smaller than the White mother and from Table 4-67 it can be seen that she had significantly less weight gain in pregnancy than did the White mother. In fact the recommended weight gain during pregnancy is between 9 and 13 kg., however, the average weight gain for Native mothers was only 7.9 kg., whereas for Whites it was 10.6 kg.

Table 4-67
AVERAGE WEIGHT GAIN DURING PREGNANCY (kg)

	INUIT (1)	INDIAN(2)	WHITE(3)	OTHER(4)
Mean	7.086	7.9565	10.5932	8.7725
Standard Deviation	4.935	5.638	5.466	6.498
Number	310	145	311	62

Anova with Scheffe's Contrast test
Groups 1, 2, 4, < 4,3 $p<0.05$

It seems possible then that the reason weight and weight gain were such relatively strong determinants of birth weight among Native mothers, is that the nutritional status of these mothers could be improved and that any improvement was reflected in the birth weight of their infants. Among White mothers, however, while one cannot say that nutritional status was perfect, it was sufficiently adequate and maintained throughout pregnancy that its influence on birth weight was not so obvious. These data point to the need for medical personnel in the North to ensure adequate weight gain for all mothers during pregnancy. This is generally considered to be between 9 and 15 kg. (20-35 lb).

Birth Weight and Maternal Smoking

The effect of maternal smoking was one environmental factor affecting birth weight that was examined in detail and Table 4-68 shows that in all ethnic groups smoking adversely affected birth weight.

Table 4-68
BIRTHWEIGHT (gm) COMPARED WITH MATERNAL SMOKING HABITS

	INUIT (1)	INDIAN	WHITE(2)	OTHER(3)	TOTAL(4)
		BW(S.D.)	BW(S.D.)	BW(S.D.)	BW(S.D.)
CIGARETTES/DAY	BW(S.D.)	BW(S.D.)			
A. None	3486(566) N = 62	3219(686) N = 44	3440(469) N = 186	3612(665) N = 24	3431(545) N = 316
B. 1 - 7	3237(626) N = 105	3241(615) N = 69	3293(437) N = 36	3326(498) N = 8	3251(588) N = 218
C. Over 7	3073(606) N = 198	3133(657) N = 58	3116(488) N = 115	3143(801) N = 31	3100(597) N = 404

(1) Difference between mean weights is significant at $p<0.05$ for groups A-B, A-C.
(2) Difference between mean weights is significant at $p<0.05$ for groups A-C.
(3) Difference between mean weights is significant at $p<0.05$ for group A-C.
(4) Difference between mean weights is significant at $p<0.05$ for groups A-B, A-C, B-C.
Statistic used is Oneway Anova with Scheffe's Contrast Test.

Inuit infants of mothers who did not smoke had a mean birth weight of 3486 gm compared to a birth weight of 3073 gm among infants whose mothers smoked over seven cigarettes per day. The differences between birth weights of smoking and non smoking mothers are clearly present for all groups except the Indian, but the trend is obvious even among this group. These data are not surprising and are in agreement with studies done elsewhere on the effect of maternal smoking on birth weight (Butler and Alberman, 1969). They do serve to reinforce educational efforts on the adverse effects of smoking.

Other anthropometric measures of the infant may be found in Tables 4-69 to 4-71.

Table 4-69
LENGTH OF INFANT (cm)

	INUIT (1)	INDIAN(2)	WHITE(3)	OTHER(4)	TOTAL
Mean	49.7	49.3	50.6	50.0	49.9
Standard Deviation	4.2	4.5	3.3	4.0	3.9
Median	49.9	49.8	50.6	50.0	50.1
Total	436	204	367	88	1095
No Data	42	12	36	6	96

Oneway Anova with Scheffe's Contrast Test
Group 1,2 vs Group 3 $p<.05$.

Table 4-70
CHEST CIRCUMFERENCE OF INFANT (cm)

	INUIT	INDIAN	WHITE	OTHER	TOTAL
Mean	33.6	32.7	33.2	33.8	33.3
Standard Deviation	2.5	2.6	2.5	3.8	2.7
Median	33.7	32.9	33.6	33.8	33.5
Total	414	194	358	86	1052
No Data	64	22	45	8	139

Table 4-71
HEAD CIRCUMFERENCE OF INFANT (cm)

	INUIT (1)	INDIAN(2)	WHITE(3)	OTHER(4)	TOTAL
Mean	33.9	33.2	34.2	34.5	33.9
Standard Deviation	1.96	2.3	2.3	2.2	2.2
Median	34.0	33.5	34.5	34.8	34.1
Total	436	205	371	86	1098
No Data	42	11	32	8	93

Oneway Anova & Scheffe contrasts for difference between means Group 1,2 vs Group 3 $p<.05$.

The length and head circumference of the infants of Indian and Inuit mothers were smaller than the infants of White mothers; this is in keeping with the observation that their birth weights were also less.

PROBLEMS IN THE NEONATAL PERIOD

Tables 4-72 to 4-77 outline the major problems presented by the infant in the neonatal period. A major worry in the neonatal period is the presence of respiratory distress or infection - since both of these require immediate aggressive and definitive therapy. Serious infections such as sepsis, pneumonia meningitis and gastroenteritis were found in 2.9 percent of infants. Minor infections of an unspecified nature occurred in a further 19 percent (Table 4-72).

Table 4-72
INFECTIONS IN NEONATAL PERIOD

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
None	314	67.5	168	82.8	326	86.7	75	87.2	883	78.1
Sepsis	1	0.2	0		--	--	--	--	1	0.1
Pneumonia	6	1.3	1	0.5	2	0.5	--	--	9	0.8
Meningitis	--		1	0.5	--	--	--	--	1	0.1
Gastro	10	2.2	4	2.0	3	0.8	1	1.2	18	1.6
Other	134	28.8	29	14.3	45	12.0	10	11.6	218	19.3
Total	465		203		376		86		1130	
No Data*	3		12		25		8		48	

*Total + No Data = 1178 due to 13 stillbirths.

Respiratory distress was present in 4.2 percent of infants, the majority of whom were Native born (Table 4-73).

Table 4-73
RESPIRATORY DISEASE IN NEONATAL PERIOD

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
None	432	93.3	195	96.1	371	98.9	81	95.3	1079	95.8
Hyaline Membrane Disease	6	1.3	5	2.5	3	0.8	1	1.2	15	1.3
Other	25	5.4	3	1.5	1	0.3	3	3.5	32	2.9
Total	463		203		374		85		1126	
No Data*	5		12		27		9		52	

*Total + No Data = 1178 due to 13 stillbirths.

Infant trauma was noted in 1.2 percent of cases, however the exact nature of the trauma has not been documented (Table 4-74).

Table 4-74
TRAUMA IN NEONATAL PERIOD

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
No	454	98.1	200	98.5	373	99.5	85	100	1112	98.8
Yes	9	1.9	3	1.5	2	0.5	0	--	14	1.2
Total	463		203		375		85		1126	
No Data*	5		12		26		9		52	

*Total + No Data = 1178 due to 13 stillbirths.

Other neonatal conditions of importance are presented in Table 4-75; the striking finding here is the high incidence of jaundice (22.6%).

Table 4-75
OTHER NEONATAL CONDITIONS

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
None	332	69.4	160	78.8	305	81.1	71	81.6	858	75.9
Convulsions	3	0.6	--	0.0	1	0.3	--	--	4	0.4
Hemorrhage	4	0.9	1	0.5	--	--	--	--	5	0.4
Jaundice	131	28.2	41	20.2	68	18.1	15	17.2	255	22.6
Combinations of Above	2	0.4	1	0.5	1	0.3	--	--	5	0.4
Other	2	0.4	--	--	1	0.3	1	1.1	3	0.3
Total	464		203		376		87		1130	
No Data*	4		12		25		7		48	

*Total + No Data = 1178 due to 13 stillbirths.

Most likely this was of a physiological nature in the majority of cases since there were no cases of neonatal hepatitis recorded, less than 15 serious infections which might cause jaundice (Table 4-72) and only nine cases of hemolytic disease (Table 4-76).

Table 4-76
HEMOLYTIC DISEASE IN NEONATAL PERIOD

	INUIT		INDIAN		WHITE		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%
None	459	98.9	202	99.5	372	99.2	85	100	1118	99.2
Rh Incompatability	4	0.8	1	0.5	0	--	--	--	8	0.7
ABO Incomp.	1	0.2	--	--	3	0.8	--	--	1	0.01
Total	464		203		375		85		1127	
No Data*	4		12		26		9		51	

*Total + No Data = 1178 due to 13 stillbirths.

Of the 1178 live born infants, 49 required hospitalization for various problems. Nearly one-half of these hospitalized infants were of Inuit origin, one-quarter of Indian origin and the remainder were of White or Other origin.

Of these 49 requiring hospitalization, 19 infants, (7 Inuit, 5 each of White and Indian origin, and 2 of Other origin), required referral to Southern hospitals for more complete care. Sixteen of these had been born in a hospital in the NWT. Thus, of the 1178 infants born alive, 33 or 2.8 percent required transferral from their place of birth to a more sophisticated centre - a small proportion, but nevertheless a significant one.

Table 4-77 shows that the 19 infants referred South had a constellation of serious problems with congenital defects being the most common general category and infectious disease a close second.

Table 4-77
CONDITIONS REQUIRING HOSPITALIZATION IN A SOUTHERN HOSPITAL IN THE FIRST WEEK OF LIFE

Nature of Illness	N	%
Congenital Defects	17	21.5
Cardiovascular System	5	6.3
Central Nervous System	4	5.1
Gastrointestinal Tract	4	5.1
Other	4	5.1
Infections	16	20.3
Respiratory Distress of The Newborn	13	16.5
Jaundice	12	15.2
Low Birth Weight	9	11.4
Other	12	15.2
Total Conditions	79	

Problems peculiar to the newborn period (respiratory distress, jaundice, and low birth weight) were the most common general problem, but when subdivided into specific categories they assumed a lesser frequency.

From these data it is clear that although most infants did not pose an immediate medical problem, there was still an appreciable number of infants afflicted with life threatening disease. For optimal care these infants must be detected and treated as soon as possible. This requires both adequate facilities to meet the infant's medical needs and medical professionals trained to detect the ill infant and institute appropriate therapy.

SUMMARY AND CONCLUSIONS

This chapter has presented in outline form the events and circumstances surrounding the gestation and birth of the infants of this study. Of the 1179 pregnancies, 281 were in grand multiparas, the majority of these being Native (Inuit or Indian) mothers. The proportion of mothers at the extremes of age (<20 years or >35 years) was more than twice as great among the Native as among the White women. Over four times as many Native mothers were single compared to White mothers. Native mothers had also a higher incidence of prenatal illness than did White mothers. The Inuit mother had a pregnancy history of more stillbirth and neonatal deaths than did either Indian or White mothers.

All the above factors are ones recognized as contributing to the potential morbidity and mortality of the present fetus and newborn infant and therefore tend to place the Native mother, especially the Inuit, at a high risk of developing problems during the present pregnancy.

On the positive side, Inuit mothers appeared to be very cooperative in coming for prenatal care. This was not the case for Indian mothers who tended to default in this area. It was interesting to note that, consistent with observations made throughout this report, more prenatal visits were made by all ethnic groups in settlements of less than 1000 people as compared to settlements of over 1000 people.

The provision of prenatal care provided the opportunity to monitor the course of pregnancy and to prevent or detect problems before they became serious. With this thought in mind, the data available show evidence of incomplete record keeping. In part, for example with blood typing and serology, this may reflect difficulties in properly storing and shipping blood samples to a laboratory, but in part it appears simply to be a failure to record routine parameters. The significance of this for any one case is difficult to assess; however, it is felt that, in general, record keeping could be more meticulous.

Detecting risk factors before they become problems is important and, in this respect, it is dismaying to note that detection of such risk factors was poorly done. This may reflect an over zealous attitude on the part of the committee to detect all risk factors, or it may reflect the fact that the nurse "knows" the patient and did not feel it necessary to record all the risk factors. However, when considering the latter alternative, one must consider the fact that if the nurse were unavailable, (e.g. on holidays and a spare nurse taking her place), or if the patient was to be delivered in another community (e.g. MEDEVAC), their data are not readily available on the chart.

There was a significant frequency of concurrent non-obstetric and obstetric illness among all 4 groups but most commonly among the Inuit. These data indicate the need for competent medical care of a wide spectrum rather than just a competent midwife. Overall, most infants were born in hospital; however, a significant proportion of Native infants, especially Inuit, were born in a nursing station. In view of the demonstrated "higher risk pregnancy" in Native mothers, those mothers who are to be delivered in nursing stations should be very carefully chosen in order to minimize complications.

Five northern centres accounted for nearly 74 percent of all births in the NWT. These five centres should be equipped for obstetric service sufficient to meet nearly all the needs of the mother and newborn infant. This includes not only the physical facilities sufficient to meet high obstetric and neonatal standards but also personnel experienced in the management of pregnancy, parturition and the newborn infant.

The majority of White infants, but less than 70 percent of Inuit and Indian infants were delivered by a physician. These data underlie the need for nurses providing care to Native mothers to be competent and experienced in midwifery. Maternal delivery trauma occurred in a significant proportion of mothers of all ethnic groups, with moderate and major trauma being common among those mothers having any degree of trauma. Blood loss of over 500 cc occurred in twice as many Indian and Inuit mothers as White mothers. All these statistics again underlie (a) the higher risk of obstetric problems that the Native mother has relative to the White mother and (b) the need for medical personnel to be well versed in all facets of obstetric care.

With respect to the infant, at age five minutes nearly seven percent were still in some degree of cardio respiratory distress. These infants require close monitoring for the first day or so of life; monitoring by individuals who know what to look for, and what to do. Sometimes the necessary therapy is very simple, e.g. nothing at all or gentle suctioning plus a little warmth and oxygen; sometimes the therapy is very complex requiring the full support of an intensive care unit. Any individual who is responsible for the care of newborn infants must be trained in the resuscitation of these infants, in the recognition of the sick neonate (not always an easy task) and in the sequence of therapeutic procedures which must be followed to resolve the infant's problem.

Significant differences in birth weight were apparent between the ethnic groups, the Inuit having the lowest average birth weight and the highest frequency of infants with a birth weight of <2500 gm. Although it is quite possible that some of the differences are due to genetic influences, it is also likely that the nutritional status and age of the mother also exerts an influence. Low birth weight has been shown by many workers to be associated with a higher incidence of infant morbidity and mortality. For this reason, the nutritional health of all pregnant mothers must be assured. They should be made aware of the role nutrition plays in the health of the unborn child and, where it is apparent that the mother is not receiving adequate nutrition, action should be taken to remedy the situation.

Our data show the degree to which maternal smoking is closely and adversely allied to birth weight - possibly by influencing the mother's appetite and possibly by a direct effect on uterine blood supply. Whatever the pathogenesis, mothers who smoked had smaller infants than mothers who did not smoke. This is a universal phenomenon, recorded round the world, and leads to the inescapable conclusion that pregnant women should not smoke.

Nearly 5 percent of infants required hospitalization for various problems, and about 40 percent of these required transferral to a Southern centre for further treatment. Infections, congenital defects and problems peculiar to the newborn period were the main reasons for hospitalization. These data only reiterate the need for personnel working with infants to be well versed in the recognition and initial management of the sick neonate. It is unrealistic to expect tertiary care standards in a northern hospital; neither the cost of maintaining such a facility nor the frequency of illness justifies it. However, it should be emphasized that doctors and nurses responsible for the health of the pregnant woman and her newborn infant be able to recognize a significant medical problem when it presents, and to provide basic definitive medical care until help, if necessary, can be obtained or the patient transferred to a larger centre.

Finally, the data of this study question the routine practice of referral of mothers to hospital for purposes of confinement whose sole indicators for such referral is a parity of five or more or an age above 35.

CHAPTER 5

PERINATAL DEATHS IN THE NORTHWEST TERRITORIES

by R.S. Tasker

INTRODUCTION

Anyone who has been involved in an evaluation of perinatal statistics will appreciate the reservations which must, for the sake of honesty and objectivity, be applied to data obtained from a widely dispersed population in an isolated geographical area which includes developing societies with different languages and cultures. The particular difficulties encountered with the assessment of perinatal care for this study include the following factors:

Language

Good histories were impossible to obtain in many cases.

Timelessness

Events were not pin-pointed by dates as in White society. In all societies it may be difficult to get a good obstetric history from a grand multipara, but this difficulty is compounded in the NWT study. Facts like the date of the last normal period were often impossible to establish accurately.

Personnel

Personnel entrusted with the collection of perinatal data may have been inadequately trained, even though a nurse personally visited the remote settlements to give instruction and guidance.

Data Collection

Perinatal data had to be obtained from on-going clinical records completed by busy nurses and doctors who were often under stress and who may have very different medical backgrounds and therefore varying perspectives. In the best circumstances it is difficult to get consistent factual information unless the protocols are edited immediately by one competent person. This was not possible in the NWT study and allowance must be made for the reliability of the data.

Statutory Definitions

Perinatal studies focus attention on statutory definitions; unfortunately, during the study period the Ordinances of the Northwest Territories changed the definition of a stillbirth. The relevant change was from 28 weeks gestation to 20 weeks gestation and 500 gm in weight.[1] The statutory definition of a livebirth was unchanged. Because the change in the definition occurred in the midst of the study some deaths might have been missed. The fact that only four livebirths weighing less than 1000 gm were registered in this study does suggest that very small fetuses may not have had such energetic resuscitation in situations where their chances of survival were remote; it is possible that a very immature infant which did not live long would never have been reported.

While an effort was made to ensure that all eligible infants were accounted for, it will be appreciated that some of the smaller perinatal deaths of infants weighing less than 1000 gm may not have been registered. Recommendations correcting this situation were implemented but not in time to cover the whole study period.

FEDERAL PERINATAL STATISTICS

The Statistics Canada perinatal rates for the NWT in 1973 and 1974 were 21.4 and 32.1 respectively, this may be compared with 17.6 and 16.2 for Canada (Statistics Canada, 1974). The yearly fluctuations in the NWT are associated with the small size of the annual birth population (around 1200 births) whereas there are between 340000 and 345000 births in Canada annually. While the NWT rates are higher than the Canadian average, it should be borne in mind that the NWT birth population contains greater proportions of high-risk Native people; the ratio in the survey year was about 2 Natives:1 White.

STUDY PERINATAL STATISTICS

In the NWT there were 1178 livebirths and 13 stillbirths during the study year; 16 of the liveborn infants died during the first week of life (Table 5-1). These statistics give a perinatal death rate of 24.3 (over 500 gm in weight) and 21.1 (over 1000 gm in weight). The formula for computing this rate is based on birthweight rather than gestation (WHO, 1970).

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[1] The original definition of stillbirth was "stillbirth" means the complete expulsion or extraction from its mother after at least 28 weeks pregnancy of a product of conception in which, after such expulsion or extraction, there is no breathing, beating of the heart, pulsation of the umbilical cord or movement of voluntary muscle (Vital Statistics Ordinance). In the course of the study this was changed to: "stillbirth" means the complete extraction or expulsion from its mother after at least 20 weeks pregnancy or after attaining a weight of 500 gm or more, of a product of conception in which, after such expulsion or extraction, there is no breathing, beating of the heart, pulsation of the umbilical cord or unmistakable movement of voluntary muscle.

TYPE OF BIRTH	PERINATAL DEATHS																			
	LIVEBIRTHS						STILLBIRTHS						FIRST - WEEK DEATHS#						PERINATAL DEATH RATES*	
	GRAMS						Grams												Grams	
	<500	500-1000	1001-2500	Over 2500	Not Known	TOTAL	<500	500-1000	1001-2500	Over 2500	Not Known	TOTAL	<500	500-1000	1001-2500	Over 2500	Not Known	TOTAL	Over 500	Over 1000
SINGLE	-	4	84	1036	33	1,157	-	2	3	4	1**	10	-	3	10	2		15	21.4	17.2
MULTIPLE	-	-	9	12		21	-	-	2	1		3	-	-	1	-		1	166.7	166.7
TOTAL	-	4	93	1048	33	1,178	-	2	5	5	1	13	-	3	11	2		16	24.3	21.1

*Formula = $\frac{\text{Fetal deaths} \geq 500 \text{ gms. (or 1000 gms)} + \text{F.N.D.'s} \geq 500 \text{ gms. (or 1000 gms.)}}{\text{Livebirths} \geq 500 \text{ gms. (or 1000 gms.)} + \text{S.B.'s} \geq 500 \text{ gms. (or 1000 gms.)}} \times 1000$

**Gestation 42 weeks and taken as full-size in rates

#Seven periods of 24 hours

Table 5-1 PERINATAL STATISTICS FOR THE NORTHWEST TERRITORIES DURING THE STUDY YEAR

The Federal definition of a stillbirth is based on gestation which is an unreliable variable in the present study. No gestation period was ascertainable on four of the stillbirths, whereas only one fetus was not weighed.

Stillbirths account for 45 percent and first-week deaths for 55 percent of the perinatal deaths. In perinatal programs where aggressive neonatology is available to salvage the infant at birth this ratio might be reversed. It is in the management of first-week deaths that the greatest gains have been made in recent years; however, to justify a neonatal intensive care unit and to retain the highly trained medical and para-medical staff required to run it, a birth population of at least 10000 births per annum is suggested by the Joint Committee of the Society of Obstetricians and Gynaecologists of Canada and the Canadian Pediatric Society (Swyer and Goodwin, 1973). This makes such a suggestion impractical in the Northwest Territories. For the time being, the main effort should be in encouraging rapid evacuation of mothers and their infants.

The occurrence of low birth weight (LBW) births of 2500 gm and less was approximately 8.6 percent of total births in the study year (Table 4-61). This rate of 8.6 percent does not look abnormally high until it is broken down by ethnic origin of the mother; then it is apparent that the LBW rate for Indian and Inuit mothers (11-12%) is more than twice that of White mothers (4%).

GEOGRAPHICAL DISTRIBUTION

The geographical distribution of the Indian and Inuit population is described in Chapter 3. The occurrence of perinatal deaths is shown in Figure 5-1.

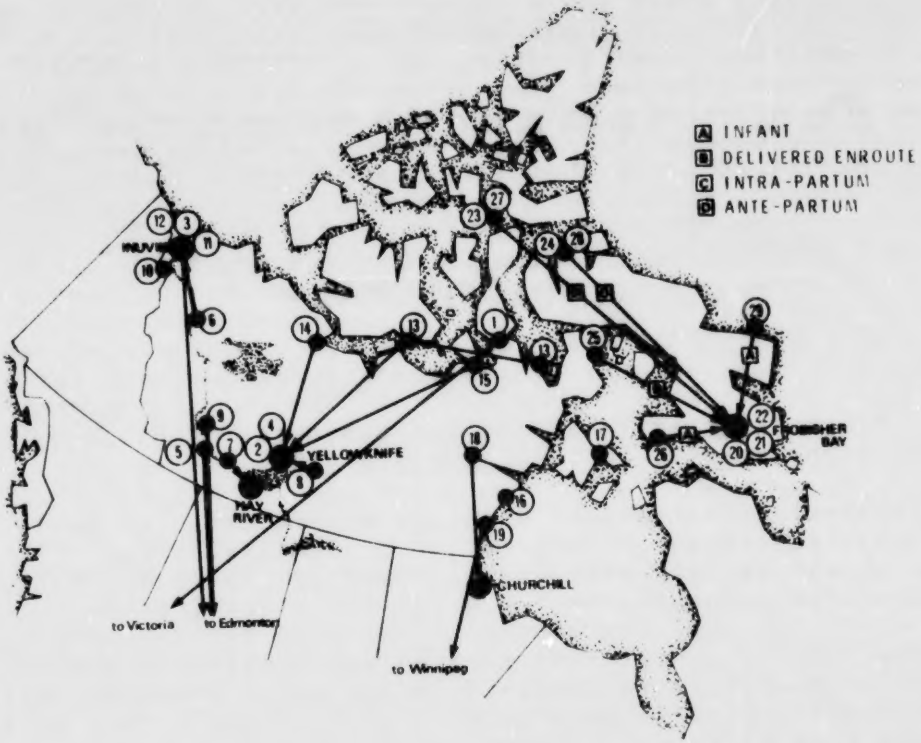
🅰 INFANT
🅱 DELIVERED ENROUTE
🅲 INTRA-PARTUM
🅳 ANTE-PARTUM
INUVIK
YELLOWKNIFE
HAY RIVER
CHURCHILL
FROBISHER BAY
to Victoria
to Edmonton
to Winnipeg

FIGURE 5-1 GEOGRAPHIC DISTRIBUTION OF PERINATAL DEATHS The numbers refer to individual cases, not to communities.

THE WHITE PERINATAL DEATHS

There were 4 deaths, giving a perinatal death rate of about 10 per thousand White mothers. These mothers are numbers 1-4 in Figure 5-1.

The points to note about these White perinatal deaths are:

1. they included no low-birth-weight infants,
2. the mothers were under the supervision of doctors and were delivered in the larger hospitals,
3. three deaths were from malformations incompatible with life; these events are usually not anticipated; there were no avoidable factors,
4. the fourth death was a postmature antepartum death of a second full-size twin.

THE INDIAN PERINATAL DEATHS

There were 6 deaths, giving a perinatal death rate of about 28 per thousand Indian births. These mothers are numbered 5-10 in Figure 5-1. They include:

1. one death of a very premature infant born in an Indian cabin (No. 5),
2. three deaths associated with antepartum bleeding (Nos. 6,7,8) though the actual cause of death in the last listed case was a congenital abnormality; these three labours were premature,
3. two identified high-risk mothers (Nos. 9,10), one with possible placental insufficiency and the other had a twin pregnancy.

This group of Indian perinatal deaths has the following characteristics:

1. all infants are low-birth-weight,
2. half the maternal histories involve antepartum bleeding,
3. one mother sought no medical care at any time, the remaining mothers were referred from Nursing Stations to physicians,
4. there may be evidence of lack of aggressive neonatal therapy in the management of two newborns in hospitals.

THE INUIT PERINATAL DEATHS

There were 19 deaths giving a perinatal death rate of about 40.0/1000 Inuit births. These deaths are numbered 11 to 29 in Figure 5-1.

Inuvik Zone

The perinatal death rate for this zone was about 42/1000 Inuit births. There were two Inuit deaths (Nos. 11 and 12). Both infants were born in hospital. Neither mother had received any prenatal care.

Mackenzie Zone

The perinatal death rate for this Zone was about 36/1000 Inuit births. There were 3 Inuit deaths (Nos. 13,14, and 15). All were born in hospital and had been identified by nurses as at-risk pregnancies and referred for delivery; two were for elective Caesarean section.

Keewatin Zone

The perinatal death rate for Keewatin was about 36/1000 Inuit births. There were 4 Inuit deaths (Nos. 16,17,18 and 19). Two occurred in nursing stations and two mothers were transferred to hospital, one mother with a known dead fetus and one mother was in labour.

Baffin Zone

The perinatal death rate for the Baffin Zone was about 48/1000 Inuit births. There were 10 Inuit perinatal deaths in this region (Nos. 20,21,22,23,24,25,26,27,28 and 29). Only two mothers (one twin pregnancy) were resident in the area of the hospital centre. Another 2 were referred in for delivery. The remaining 6 mothers delivered at home, in nursing stations or en route to hospital.
This group of 19 Inuit perinatal deaths has the following characteristics:

1. SIZE. It is the largest group.

2. LOCATION. The greatest number of deaths is in the Baffin Zone.

3. AGE. Half of these mothers were teenagers (Nos. 13,14, 16,17,20 and 21(Twins), 22,25,28).

4. PARITY. More than half of these teenagers were having second or third pregnancies (Nos. 14,16,17,25,29) and all these infants were low-birth-weight. Two mothers (Nos. 23,24) were para 6 and 7 respectively at 34 years of age.

5. POSTMATURITY. Two mothers were grand multipara (23,24) and transferred to a hospital centre for delivery; both were allowed to go postmature.

6. BIRTHWEIGHT. Thirteen of the 19 infants weighed 2500 gm or less; this is 68 percent of the perinatal deaths and not an unreasonably high proportion.

7. FULL-SIZED INFANTS. This is the group in which avoidable factors are most easily identified and of these 6 infants:

   a. 3 pregnancies may have been postmature (19,23,24),

   b. 2 mothers had pre-eclampsia (13) and eclampsia (28),

   c. 1 mother suffered abruption of the placenta, possibly as the result of a fall on the ice.

8. GESTATION. As mentioned previously this is a very unreliable variable in this study, and was probably not ascertainable in about half of these prenatal deaths. In two mothers referred

to hospital for elective repeat Caesarean sections (14,15) there may have been avoidable factors in the estimation of the expected date of confinement.

9. AUTOPSIES. The absence of autopsy reports on these deaths leaves the pathological cause of death frequently in doubt. Only from one of the 10 Baffin Zone perinatal deaths was an autopsy report submitted and that was only a preliminary report.

10. EVACUATION. There appears to have been inability to send help to the nursing stations or to evacuate mothers during night hours (17,11).

CAUSES OF PERINATAL DEATHS

ALBERTA CLASSIFICATION

All stillbirths and first-week deaths are considered together in the analysis of cause of death since the perinatal concept is based upon the premise that the basic etiology is the same in the causes of death for these two groups. The analysis follows the practice devised in the Alberta Perinatal Study (Bell, 1964) which is: first to identify the pathological cause of death in the fetus or infant and then to trace back in the mother's history to the first link in the chain of events which resulted in the death. Any program to reduce perinatal mortality and morbidity must attack this first link as well as the final pathological cause of death. This two-dimensional classification for the 29 deaths concerned is shown in Figure 5-2.

The points of interest in this analysis are:

1. Medical conditions:

There was an absence of perinatal deaths associated with serious medical conditions such as diabetes, heart disease and hyper-tension. There were also no deaths from Rhesus sensitization.

2. Pregnancy and Labour factors:

It is also noteworthy that there were no deaths directly and nly attributable to mismanagement in labour.

The category "Intrauterine Anoxia" was 10.9/1000 births. his groups includes antepartum and intrapartum deaths associated ith placental insufficiency, pre-eclampsia, abruption of the lacenta and postmaturity, as well as cord accidents in labour

FIGURE 5.2

Total Births = 1191

Each perinatal death should be classified under both A and B by a check in the appropriate square. A. CLINICAL CLASSIFICATION	B. PATHOLOGICAL CLASSIFICATION	ABNORMAL PULMONARY VENTILATION				BIRTH TRAUMA								INFECTION				BLOOD DYSCRASIAS									
		Hyaline Mem. Disease		Atelectasis and Other		Intracranial Haemorrhage		Other		Intrauterine Anoxia		Malformation		Pneumonia		Other		Haemolytic Disease		Other		Unknown or Unclassifiable		Total		INCIDENCE	PERCENT OF PERINATAL DEATHS
		Mat.	Prem.	Mat.	Prem.	Mat.	Prem.	Mat.	Prem.	Mat.	Prem.	Mat.	Prem.	Mat.	Prem.	Mat.	Prem.	Mat.	Prem.	Mat.	Prem.	Mat.	Prem.	Mat.	Prem.		
MATERNAL CONDITION Infection	Mat.																									—.—	—.—
	Prem.																										
Diabetes	Mat.																									—.—	—.—
	Prem.																										
Hypertension	Mat.																									—.—	—.—
	Prem.																										
Fall Other Previous C.S.* Bad Obstetrical History	Mat.									1														1		3.3	13.8
	Prem.										2												1		3		
COMPLICATION OF PREGNANCY: Toxaemia	Mat.									2														2		1.7	6.9
	Prem.																										
Antepartum Hemorrhage	Mat.																									2.5	10.3
	Prem.										3														3		
Haemolytic Disease	Mat.																									—.—	—.—
	Prem.																										
Twins (4) Other Postmature Placental Insufficiency	Mat.									4														4		7.6	31.0
	Prem.										1		1										3		5		
COMPLICATION OF LABOUR: Prolapse of Cord	Mat.																									—.—	—.—
	Prem.																										
Abnormal Presentation	Mat.																									—.—	—.—
	Prem.																										
Arrested Labour Leading to Trauma	Mat.																									—.—	—.—
	Prem.																										
Other	Mat.																									—.—	—.—
	Prem.																										
NO APPARENT MATERNAL OR OBSTETRICAL FACTOR:	Mat.											2												2		5.0	20.7
	Prem.		1										2										1		4		
UNCLASSIFIABLE:	Mat.																									4.2	17.2
	Prem.		1		1																		3		5		
TOTAL:	Mat.									7		2												9		24.3	100.0
	Prem.		2		1						6		4										7		20		
INCIDENCE PER 1000 BIRTHS:					2.5				—.—		10.9		5.0				—.—				—.—		6.7		24.3		
PERCENT OF PERINATAL DEATHS					10.0				—.—		44.8		20.7				—.—				—.—		27.6		100.0		

* Caesarian Sections

and deaths of infants who are severely anoxic at birth. Intrauterine anoxia accounted for deaths in 6.3/1000 births in Alberta in 1973 (Perinatal Committee of the Alberta Medical Association--Unpublished Statistics) and is the cause of about one third of perinatal deaths in most studies.

3. Neonatal Factors:

The incidence of "Abnormal Pulmonary Ventilation" of 2.5/1000 births appears to be higher than the Alberta figure for 1974 of 0.9 (Unpublished Perinatal Committee Statistics). The "Malformations Incompatible with Life" rate of 5.0 was above the average which is about 3.0/1000 births in most studies and 2.3 in Alberta in 1973. The NWT malformation deaths were strangely and heavily weighted with White mothers (3) whereas there were only one Indian and two Inuit perinatal deaths associated with this factor; this White predominance was probably only coincidental and related to the smallness of the sample. In one case it was noted that rubella vaccination was given just prior to the pregnancy; reminders to the Nursing Stations should emphasize that mothers should take precautions to ensure that pregnancy does not occur within three months of these vaccinations.

The high proportion of deaths in the "Unknown" category is related to the unavailability of the autopsy reports. This deficiency must be borne in mind when interpreting the other classes.

BAIRD'S CONCEPTUAL APPROACH TO CAUSE OF DEATH CLASSIFICATION

Baird (in Butler and Alberman, 1969), who pioneered the work in the epidemiological analysis of perinatal data, points out that perinatal death rates are influenced by the health, physique and reproductive habits of the mothers as well as by the standards of medical care available to them. He designates the first category "Environmental" factors, because these factors respond to general improvement in the health and lifestyles of the population, and the second category "Obstetrical" because they relate to the increased availability of skilled medical care. The "Environmental" factors are:

a. Prematurity of unknown origin.

b. Malformation.

c. Antepartum hemorrhage.

d. Miscellaneous causes.

These variables are associated with low socio-economic status, grand multiparity, extremes in reproductive age and smallness of stature. Habits such as heavy cigarette smoking and alcoholism would also characterize this high-risk lifestyle.

The perinatal factors which respond more readily to the availability of skilled medical care and hospital facilities are:

a. Pre-eclampsia.

b. Mechanical factors.

c. Mature deaths - cause unknown - ?Placental insufficiency.

d. Rh sensitization.

As is shown in the following analysis, the above two classifications are applicable to the NWT data.

A. ENVIRONMENTAL FACTORS

Prematurity of unknown origin:

As mentioned earlier, the low-birth-weight rate in Indian and Inuit births is high. The proportion of perinatal deaths associated with low-birth-weight is also high in this ethnic group; 19 out of 25 perinatal deaths (76%) weighed 2500 gm or less. It is interesting that it was in the group of mothers of parity 1-3 that 15 infants were low-birth-weight; of these mothers there was no obstetrical history for 3, but 9 others were delivering a second pregnancy within a year of a previous delivery. Baird uses the phrase "prematurity of unknown origin" but it is known that pregnancies too close together may result in the birth of low-birth-weight infants.

Malformation incompatible with life:

The incidence of malformations incompatible with life was high in the overall sample of perinatal deaths and the majority of these deaths were to White mothers. It is not possible to offer a logical explanation for this except to suggest that it was coincidental and associated with the smallness of the population of White births. The absence of autopsy reports on 12 Inuit mothers could have influenced this classification for the Inuit group.

Antepartum Hemorrhage:

The incidence of this variable appears to be higher in the Northwest Territories but, without good documentation as to the origin of the bleeding, it is difficult to comment. The possible sites of bleeding are: (Donald, 1969)

a. Placenta previa.

b. Accidental hemorrhage: abruptio placenta.

c. Extraplacental incidental source.

d. Vasa previa.

e. Small recurrent hemorrhages which may be associated with a circumvallate placenta.

f. Origin of hemorrhage cannot be determined.

The H-ICDA codes used in the Northwest Territories study gave the following list of hemorrhages (Table 5-2):

Table 5-2 CAUSES OF HEMORRHAGE

Pregnancy	No. of Cases	Total
Threatened abortion	11	
Other unspecified hemorrhage	19	
Other antepartum hemorrhage	5	
Hemorrhage from a marginal sinus	1	
Subtotal		36
Delivery		
Placenta previa complete	3	
Placenta previa partial	6	
Premature separation of placenta (partial)	20	
Premature separation of placenta (complete)	3	
Traumatic abruption of placenta	1	
Rupture of a marginal sinus	1	
Other antepartum hemorrhage	69	
Subtotal		103
Total		139

Since most of the causes of hemorrhage in pregnancy are very likely to give rise to further hemorrhage in labour and the above categories are not mutually exclusive there is probably duplication in this list.

The perinatal deaths associated with antepartum hemorrhage are shown in Table 5-3.

Table 5-3
PERINATAL DEATHS ASSOCIATED WITH ANTEPARTUM HEMORRHAGE

CASE NO.	TYPE OF ANTEPARTUM HEMORRHAGE	OTHER FACTORS	BIRTH WEIGHT GRAMS
6	Unspecific	Cellitis of leg	670
7	Abruption of placenta	Fall	1276
8	Placenta previa	Malformation	1410
13	Abruption of placenta	Pre-eclampsia	3600
17	Abruption of placenta	Premature ruptured membranes	535
18	Abruption of placenta	Accident-exposure Malformation	3024

In the First Report of the British Perinatal Mortality Survey (Butler and Bonham, 1963) the overall incidence of antepartum hemorrhage in the population concerned is given as 6.0 percent (p. 104) and present in 17.6 percent of perinatal deaths with a perinatal mortality rate seven times that of those cases in which no bleeding was reported (p. 104). The NWT figure of 139 patients with histories of bleeding gives a rate of 11.4 percent of births. If the NWT perinatal death rate was correspondingly high, which relatively it is not, then the assumption that antepartum hemorrhage contributed excessively to the NWT perinatal loss might be justified.

Miscellaneous Causes:

Such accidents as falls on the ice, skidoo accidents, exposure, etc. contribute to perinatal problems. There were 3 deaths associated with these causes.

B. OBSTETRICAL FACTORS

Pre-eclampsia

There seems to have been a lower incidence of this complication in the Northwest Territories. Two perinatal deaths occurred; both these mothers (13 and 28) were young Inuit primigravidas who arrived in the Nursing Stations in labour with fulminating pre-eclampsia (13) and eclampsia (28); neither had shown any symptoms during pregnancy. Both pregnancies were just pre-term. In the first case the nurse had the mother evacuated but the placenta abrupted and the mother arrived in hospital with a dead fetus (3600 gm); in the second case the nurse was faced with the labour and delivery of a primigravida with convulsions, hypertension and proteinuria. Evacuation was impossible at the time, but she had telephone communication with the doctor in Frobisher Bay. The second stage, even with an episiotomy, took one hour; the infant was delivered alive but covered in meconium and severely anoxic; it survived only a few hours.

In both these instances a major crisis arose suddenly in a remote northern community. Both these deaths were unavoidable in the circumstances in which they occurred. The nurses should be commended for saving the lives of the mothers. Both infants would probably have lived had the mother delivered in a perinatal intensive care unit.

Labour Factors:

There were no deaths primarily due to labour factors, but Caesarean sections should be considered under this heading. There were 56 Caesarean sections during the study year, which is an incidence of 4.7 percent of births, and there were four perinatal deaths which gives a rate of 77/1000 Caesarean section births. The incidence of repeat sections was low. The incidence of Caesarean section by ethnic origin was: Inuit 2.5 percent, Indian 4.2 percent and White 7.9 percent.

It is interesting to look at the difference that geographical location has made to the physician's decision to resort to Caesarean section for other than urgent maternal reasons. In urban situations in Alberta the Caesarean section rates have been steadily increasing to the point where 8.1 percent of pregnancies were delivered by Caesarean section in 1975 (Unpublished Perinatal Committee Statistics) with a perinatal death rate of 16.7/1000 Caesarean section births (all weights). There was one maternal death in 1973 in Alberta from rupture of a Caesarean section scar during a subsequent pregnancy, which supports the fact that the procedure is not completely without future hazard. Physicians do, however, consider quick resort to section as the management of choice when the mother has easy access to a perinatal intensive care unit where necessary in a subsequent pregnancy, and to sterilization after the second or third infant.

This "urban" situation with immediate physician availability is not the way of life for Indians and Inuit in the Northwest Territories and, because of the smallness of their settlements, the existing facilities are unlikely to change in the immediate future. The low Caesarean section rate and high perinatal death rate may reflect the northern physicians' appreciation of the fact that a scar in the uterus of a mother who will be moving out of the orbit of immediate physician care should be avoided at all costs in the interest of the mother's life, even if it costs the life of her present fetus. The one possible exception is cephalo-pelvic disproportion which might be present in all future pregnancies. The low incidence of Caesarean section among Native mothers in the Northwest Territories during the study year may reflect an appreciation of this philosophy. The one perinatal death associated with a primary Caesarean section illustrates the physician's dilemma in trying to avoid a section on an Indian mother who came in bleeding and whose physician was eventually driven to sectioning her 19 hours later for placenta previa. She immediately became a high risk gravida 6, para 4, with a scarred uterus who will in future need hospitalization well before the expected date of delivery so that she can be under constant supervision. Such mothers do not adapt well to pre-delivery hospitalization and, should they feel well, they are prone to taking their own discharge.

The second primary section was performed for a prolapsed cord on the first of twins in a young Indian mother. This section was done in Edmonton and brings up a point which may need careful consideration in the future. The question is that of specialists in the Southern perinatal intensive care units being aware of the dangers of creating high-risk obstetrical mothers, and sending them back to remote outpost nursing station areas where the kind of support they may need in a subsequent pregnancy may not be available.

The remaining two Caesarean section deaths were from prematurity after repeat Caesarean section. Both were to young mothers who had Caesarean section for cephalo-pelvic disproportion with their first pregnancies. In both cases there was some ambiguity in their expected dates of confinement and the evacuations to hospital were at what was reported as 36 and 35 weeks; the first mother to await elective section and the second mother in possible premature labour. It was likely, in both cases, that the dates were inaccurate, as the infants born were so much smaller than expected. The dilemma of both the mothers and their medical attendants can be appreciated when they know that evacuation by air is essential for safe delivery. This type of situation should be avoided whenever possible. Emergency medical evacuations carry a risk not only to the mother but to pilot and attendants. There was an example of this in an air crash which cost three lives just prior to the study year.

Placental Insufficiency (deaths of uncertain origin in babies mature by weight)

There were 3 deaths associated with postmaturity and possible placental insufficiency. Two were grand multiparas and the third was a para 2. All were Inuit. The two grand multiparas were evacuated to Frobisher Bay, one after fetal death and one two weeks prior to fetal death, the third mother was evacuated in desultory labour. In a Southern Canadian perinatal intensive care unit it might have been possible to save these three fetuses by an aggressive approach to the assessment of fetal well-being; always in the background would lurk the probability that, once the decision has been made to get the mother delivered, emergency Caesarean section would be a probable outcome. Yet would this type of care have been in the best interests of these Inuit mothers who would be returning to remote settlements in the High Arctic with only nursing station care in a future emergency? It is likely that the conservative care they did receive was more appropriate in spite of the resultant perinatal deaths. In the circumstances the nurses rightly identified and evacuated high-risk multiparas who could have had serious complications in labour; these mothers were certainly not candidates for delivery in a nursing station. But in this situation the physician's hands are tied if a permission for tubal ligation does not accompany the mother to be used if surgical intervention is indicated for obstetrical reasons. These permissions should be signed by both husband and wife and, since it is difficult and time consuming to get the at-risk and sterilization concepts across the language barrier, it might be wise to make it part of prenatal care routines to discuss this procedure with the high-risk mother and her husband before an emergency arises. The signed permission could accompany the mother to the hospital so that it is available if surgical intervention is indicated.

Rhesus Incompatibility

This was not a cause of perinatal death in this study. The incidence of the Rhesus factor is shown in Table 4-25.

C. MANAGEMENT OF THE NEWBORN

The immediate care of the newborn plays an important part not only in the infant's chances of survival but of its chances of survival without temporary or chronic morbidity. Care of the newborn must be immediate and aggressive; in the case of two hospital perinatal deaths the available histories suggested a rather desultory approach to the newborn crisis. This may have been due to failure to recognize an infant as being ill or at risk of suddenly becoming ill, or it may have been due to a lack of knowledge of the basic elements of newborn care.

The three essential elements in the care of every newborn are adequate warmth, adequate respiration and adequate nourishment.

Adequate Warmth

A cool environment increases the infant's need for oxygen and therefore increases pathological states induced by oxygen lack. Ways of keeping the newborn warm have to be implemented according to the facilities available. All hospitals should have an overhead warmer in the caseroom and this equipment should be taken to the Operating Room for Caesarean sections. This facility permits some exposure of the infant during resuscitation or other procedure without unnecessary chilling of the infant. In a nursing station where this equipment may not be practical, the midwife will use her ingenuity to achieve a good and safe outcome by some other means. If heating pads or hot water bottles are used they must be in covers and labels attached to the covers, and also on the wall above the bassinet ordering their removal from the bassinet or incubator before the infant is placed therein. There is always the serious risk of burns to the infant.

"Bundling" the infant after delivery should be in a warm, soft absorbant dry wrapper. The autoclaved linen wrappers so often included in sterile delivery bundles are poor substitutes for a warm bath towel and once the wrapper is damp it detracts from body heat rather than encourages its retention. The initial wrapper should be changed for a fresh dry warm one very soon after birth and then only the essential parts of the baby exposed for procedures like identification etc. There was mention of keeping the infant warm with "wet towels" in one perinatal death history: wet towels are never warm and this procedure was out-dated decades ago.

Adequate Respiration

Adequate oxygenation cannot occur without respiration and the normal newborn should inhale and cry at birth. Rough stimulation, such as slapping the infant, is contraindicated. Stroking the soles of the feet is usually sufficient to produce a normal reaction, in addition to the stimulus of birth itself. If respiration is delayed, the cause is either blockage of the air passages or depression of the respiratory centre in the brain. Posturing the infant with the head lower than the body and clearing the air passages of mucus may be sufficient to overcome the first difficulty, but facilities for immediate intubation (baby laryngoscope and endotracheal tube) must be checked and ready at all deliveries. Midwives stationed in the NWT should have supervised practice in this life saving procedure before working in the North. Once the airway is clear oxygen should be administered immediately and continued until normal respiration is established and the infant can maintain normal body colour. Either bagging, if the appropriate equipment is available, or mouth-to-mouth resuscitation in an emergency, may be necessary for the establishment of normal respiration.

Adequate Nourishment

There is increasing awareness that hypoglycemia, which can lead to brain damage, is more common in newborns than was formerly believed. Special at-risk categories are the small-for-dates infants and postmature infants, where there may have been some placental insufficiency, low-birth-weight infants and the infants of diabetic mothers. There is a 3 to 10 percent risk of brain damage if diagnosis of hypoglycemia is delayed until the clinical signs are apparent, therefore it is wise to do a Dextrostix test as soon as the infant is admitted to the newborn nursery. This may have to be repeated immediately before every feed until the blood sugar stabilizes at greater than 45 mgm. Hypoglycemic newborns need feedings urgently, breast milk if possible, but, where it is not possible to give oral feedings, dextrose solutions by the intravenous route should be considered.

COMMENT

Any newborn which has caused anxiety under any of these three headings must be considered an at-risk infant and warrants at least an immediate telephone consultation with the nearest neonatologist for the initiation of energetic and aggressive newborn management for the immediate correction of the pathology.

While the histories may not be complete for the cases reviewed in the study year and it is impossible for the review committee to appreciate the local circumstances in which the emergencies occurred, there was a feeling that more aggressive management might have been indicated in some cases. The following case is an example:

Delayed Treatment in a Perinatal Death [1]

This male infant was born to a Native woman at approximately 32 weeks gestation. This mother had no prenatal care, and her last mentrual period (LMP) was not established with certainty.

In the evening of the day prior to delivery the mother was admitted to hospital. Her membranes had ruptured earlier the same day. The onset of labour was spontaneous and early the next morning a live male infant was delivered.

At birth the baby weighed 1850 gm, had an Apgar score of 2 and 4 at 1 and 5 minutes. The infant was noted to be premature and had poor respiration, cyanosis, and a moderate degree of asphyxia. Initially the baby was managed in an isolette with oxygen at 2-3 litres and gavage fed; twelve hours later the infant was noted to have grunting respirations.

On the second day of life the infant was noted to be flaccid, cyanotic and having shallow respirations, with a "dull chest with many rales." The infant was intubated, bagged with 100 percent oxygen, an umbilical vein catheterization was performed and the infant given intravenous sodium bicarbonate and 10 percent dextrose water and he was placed on a Bird respirator. A chest x-ray was taken at this time.

Two hours later, the infant suddenly became cyanotic and the naso-tracheal tube was found to be out of place. Hand bagging was carried out at this time and the infant was given sodium bicarbonate and adrenalin. He died shortly after. The final autopsy findings revealed immaturity and hyaline membrane disease.

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[1] In all cases used as examples of various events leading to death the circumstances have been changed slightly to preserve anonymity, but the description of contributing factors has not been altered.

The committee that reviewed the circumstances of this infant's death came to the conclusions that:

1. Arrangements should have been made to evacuate this baby at birth as it was obviously sick then and steadily deteriorated.

2. Treatment with sodium bicarbonate and 10 percent dextrose water was delayed until the second day of life at which time the baby was moribund. This treatment should have been started at birth.

This baby was born in a hospital situated on a main jet airline route to the South, and there was ample time to arrange for its evacuation. Had he been born in a hospital with intensive perinatal care facilities he would very likely have survived, and even if he had been transferred at six to twelve hours of age he would still have had a good chance of survival. Only 4 babies were evacuated by air, and of these only one was sent to a hospital with full facilities for the care of sick neonates. Thus a possible criticism of the management of these babies is that so few were evacuated. As far as we can ascertain the reluctance to transfer small babies to optimal facilities is only partly related to distance and difficulty of arranging transfer. There is no evidence of a reluctance on the part of Health and Welfare to pay the costs of transfer (and they may be considerable) when there are compelling medical reasons. The reason appears to lie with medical personnel who have real difficulty in recognizing potentially fatal illness in small babies and infants. Because of the length of the transportation chain from remote nursing stations, and the ease with which it can be interrupted by bad weather at certain seasons, there must be a constant awareness on the part of nurses to consider air evacuation at the earliest opportunity. The logistics of evacuation should be worked out well in advance of the possible emergency.

DISCUSSION

The major emphasis in these perinatal deaths is on the "Environmental" rather than the "Obstetrical" aspects of this problem. While the care available in modern perinatal intensive care units does reduce the perinatal death rates in an urban population, thought must be given to the remoteness of some of the northern communities before applying all the modern obstetrical concepts to the Northwest Territories. The Northwest Territories communities need their nursing stations and the midwives who staff these stations are the backbone of the Northwest Territories health service. Courageous women who will undertake this work are not easily recruited and recruitment will become more difficult if their mothers include iatrogenically induced "obstetrical cripples" whose survival depends on hospital care. The isolated communities need very conservative obstetrical policies aimed at vaginal delivery of an infant in optimum condition. Identification and evacuation of high risk patients is essential.

Indicators of Obstetrical Risk

It is virtually impossible to predict the exact outcome of a pregnancy, and many scoring systems have been devised (Lesinski, 1975). The conditions listed below are broad indicators within which to assess at-risk mothers. In the most high-risk situations there may be more than one factor.

Social and Biological Factors

1. Age - under 16 years - over 35 years.

2. Weight - over 90 kg.

3. Single parents.

4. Underprivileged mothers.

Obstetric Factors

1. Primigravidas.

2. High Parity (4+).

3. Past Obstetric performance i.e. history of previous stillbirth or neonatal death, low-birth-weight or birth-damaged child.

Maternal Factors

1. Diabetes mellitus (insulin or gestational).

2. Hypertension or Pre-eclamptic Toxemia.

3. Rh sensitization.

4. Antepartum hemorrhage.

5. Anemia.

6. Intrauterine growth retardation.

7. Other serious maternal conditions (cardiac, renal, hepatic, cancer, etc.).

Labour Factors

1. Multiple pregnancies or breeches.

2. Failure to progress in labour (disproportion or malpresentation).

3. Premature labour.

4. Premature rupture of membranes over 12 hours.

5. Amnionitis or maternal pyrexia.

6. Oxytocin administration.

7. Hydramnios.

8. Meconium stained liquor.

9. Abnormal fetal heart on auscultation.

Indicators of Newborn Risk

The nurse should contact her regional hospital immediately after birth if any newborn:

1. is under 1800 gm in weight (of any gestation);

2. has a diagnosis of respiratory disorder requiring any form of assisted ventilation or an ambient oxygen concentration of greater than 30 percent;

3. has known or suspected congenital heart disease;

4. has known or suspected neonatal sepsis, meningitis, or other form of neonatal infection;

5. has a surgical problem;

6. has jaundice;

7. has other problems.

The present health care system in the NWT is a three-tiered structure consisting of nursing stations for non-risk mothers, hospitals for the intermediate risk group and perinatal intensive care units in the Southern provinces for high-risk mothers. The nursing stations are the backbone of the system and the perinatal death review suggests that the midwives have shown great competence and courage.

CHAPTER 6

INFANT DEATH

by W.C. Taylor and D.W. Spady

INTRODUCTION

Infant mortality, a tragedy so common among Northern infants in the past, by 1974 had declined dramatically from previous years but still remained much higher than the rest of Canada. Table 6-1 shows that the Infant Mortality Rate (IMR) in 1962 was 120/1000 live born infants and in 1974 was 42.6 but in all of Canada the IMR in 1974 was 15.0.

Table 6-1
INFANT MORTALITY RATES(a) IN THE NWT. 1962 - 1970

YEARS	INUIT (b)	INDIAN(b)	OTHER(c,b)	ALL(b)	CANADA(e)
1962(f)	194	103	27	120	27.6
1963	155	61	62	115	26.3
1964	94	73	35	69	24.7
1965(d)	95	64	12	59	23.6
1966	109	46	52	79	23.1
1967	84	45	30	59	22.0
1968	89	55	27	61	20.8
1969	91	24	21	53	19.3
1970	105	53	22	65	18.8
1971	98	79	20	58	17.5
1972	73	47	26	48	17.1
1973	45	31	13	28	15.5
1974	71	45	19	43	15.0

(a) $$\text{Infant Mortality Rate} = \frac{\text{Number of Deaths 0-365 days}}{\text{Number of Live Births}} \times 1000$$

(b) Data are rounded to nearest whole number due to low birth frequencies.

(c) The "other" group includes all but the two primary Native peoples and is largely composed of White immigrants from the South.

(d) Data from 1965 to 1974 derived from "Report on Health Conditions in the Northwest Territories 1974" (D.N.H.W., 1975).

(e) Statistics Canada

(f) Data from 1962 to 1964 derived from "Report on Health Conditions in the Northwest Territories 1970" (D.N.H.W., 1971).

The IMR for White infants born in the North tended to approximate that for all Canada. It was the Native infant, the Indian or Inuit, who had the greatest mortality.

The IMR of 45 for Northern Indians may be compared to a 1974 IMR of 37.2 for Alberta Registered Indians, and an all Canada

Indian IMR of 80 in 1962 as reported by Graham-Cumming (1967). Comparable figures for Inuit infants are difficult to obtain; however, in 1974 the IMR for Alaska Whites was 14.2, while for "Other" or "non-White" Alaskan infants it was 26.6. (Statistical Abstract of the United States, 1976). Among Greenland infants the 1973 IMR was 50.4 (Yearbook of Nordic Statistics, 1975). Among more settled Northern countries such as Iceland, Sweden, Norway and Finland the IMR was considerably lower at about 10 (Yearbook of Nordic Statistics, 1976).

This observed trend of a low IMR for White infants and a high IMR for Native infants is similar to that reported for Alaska Natives and American Indians, South African Bantu, (Richardson, 1970). Aborigines in Western Australia (Dugdale et al, 1973; Edmonds et al, 1970; Kalokerinos, 1971) and Maori infants in New Zealand (Tonkin, 1970), where the Native population experienced an infant mortality rate two to three times that of their neighbouring White population.

The statistics for the study period April 1, 1973 to March 31, 1974, are presented in Table 6-2.

Table 6-2
DEATHS OF LIVEBORN INFANTS IN THE NWT[1]

	TOTAL		INUIT		INDIAN		WHITE		MIXED		OTHER	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
Total Infant Deaths[2]	49	41.6	32	72.1	13	48.5	3	8.2	1	13.9	0	--
First Week Deaths[3]	16	13.6	8	18.1	5	18.6	2	5.5	1	13.9	0	--
Neonatal Deaths[4]	21	17.8	12	27.0	5	18.6	3	8.2	1	13.9	0	--
Post-Neonatal Deaths[5]	28	23.7	20	45.0	8	29.8	0	--	0	--	0	--
Total Live Births	1178		444		268		364		72		30	

[1] The classification used is the revised classification of ethnicity as described in chapter 3.

[2] $$\text{Infant Mortality Rate} = \frac{\text{Number of deaths 0-365}}{\text{Number of live births}} \times 1000$$

[3] $$\text{First Week Death Rate} = \frac{\text{Number of deaths 0-7 days}}{\text{Number of live births}} \times 1000$$

[4] $$\text{Neonatal Death Rate} = \frac{\text{Number of deaths 0-27 days}}{\text{Number of live births}} \times 1000$$

[5] $$\text{Post Neonatal Death Rate} = \frac{\text{Number of Deaths 28-365 days}}{\text{Number of live births}} \times 1000$$

The figures differ slightly from those of the National Health and Welfare statistics, which are based on the calendar year. During the study period there were 1178 live births and 13 stillbirths. The mortality rates show an IMR for Inuit almost five times and for Indians almost three times that of all Canada. The IMR for NWT White infants is about one-half that of the all Canada rate, but this is probably random variation in IMR due to the small sample size, and possibly also due to some missed deaths due to migration of White infants out of the NWT.

MORTALITY REVIEW COMMITTEE

All infant and perinatal deaths in the study population were reviewed as soon as documentation was available by a small committee consisting of the project nurse, two pediatricians, a pathologist, an obstetrician and at least one other member of the project committee. A representative of the NWT Medical Association and interested Territorial nurses were invited. There was a full and frank discussion making use of all available documents relevant to the birth and death of the infant, together with a summary prepared by the project nurse. Any factors causing doubt were clarified by telephone or correspondence and the case was concluded at the next meeting. The committee's conclusions were summarized in a manner designed to be helpful to those working in the field. Criticisms of medical procedures were made when warranted. The case summary and the committee's comments were then circulated to all physicians and nurses in the NWT, with care taken to preserve the anonymity of the case.

The importance of an ongoing review of deaths was realized from this experience, and the committee recommended its continuation in some form until such time as the infant mortality rate is similar to that of the rest of Canada.

The committee members participating in the "death review" soon developed an appreciation of the circumstances, social as well as medical, that surrounded deaths, and it was possible to recognize recurring patterns of morbidity and mortality while the events were still fresh in the minds of the participants. A number of these patterns are presented in this chapter.

POST PERINATAL DEATHS

There were 49 infant deaths of which 16 died within the first seven days, 5 between the eighth and twenty-eighth day and 28 between one month and one year. The Inuit group was conspicuous for its high incidence of death in the first week. It is noteworthy that no White infant died after the first month of life.

The majority of the deaths occurring in the first week of life were clearly related to prepartum factors which are described in the chapter on perinatal mortality. The main causes of the 33 post perinatal deaths (8-365 days) are presented in

Table 6-3.

Table 6-3
POST NEONATAL DEATHS (8-365 DAYS) - MAIN CAUSES

Respiratory Illness	12
Cot Deaths	8
Meningitis	3
Congenital Defects	4
Gastroenteritis	3
Miscellaneous	3
Total Deaths	33

The leading cause of post perinatal death was respiratory illness, followed by cot deaths, congenital defects, meningitis and gastroenteritis. Two infants died between the eighth and twenty-eighth day from conditions present in the perinatal period.

RESPIRATORY DISEASE

Infant deaths in 12 instances were attributed to respiratory causes. Inuit infants accounted for 9 of these deaths and Indians for 3. Autopsies were performed on only 7 cases, confirming the clinical diagnosis in 5. In the sixth case the diagnosis of cytomegalo-virus infection was made and in the seventh case the clinical diagnosis was acute laryngotracheobronchitis in an infant who actually had Reye's Syndrome. The ratio of male to female deaths was 4:8. The age at death ranged from 1 to 11 months with a mean age of 6 months. In the 5 cases where autopsies were not performed, there was unequivocal clinical evidence of respiratory tract involvement prior to death.

Four of the respiratory deaths (2 Inuit and 2 Indian), occurred in bush or hunting camps far removed from a settlement and medical care. The following case illustrates the problems involved.

Respiratory Death In A Hunting Camp

The Inuit mother of this baby had a total of 10 pregnancies and 4 infant deaths. She received no antenatal care, but her baby was delivered at a nursing station. The infant was seen at two follow-up visits after birth, and then the mother returned with the infant to the primitive living conditions of a hunting camp.

At seven months the baby was admitted to the nursing station for treatment of pneumonia and infected frost bitten toes. At that time the baby was underweight, showed delayed psychomotor development, had a head circumference below the third percentile, appeared to be deaf and the hemoglobin was 10 gm. The family returned to the hunting camp soon after and the infant was seen there a fortnight later by a visiting physician and was found to have fever and respiratory tract infection. The infant failed to improve at the camp and died within two weeks at age nine months. Any communication or transportation were impossible at the time of death. No autopsy was performed.

Committee Conclusions

The facts emphasize the particular hazards to infants in ill health living in hunting camps. This infant's attack of pneumonia in late winter was complicated by frostbite, and the baby was further handicapped by developmental delay which would have required evaluation at a later date had it survived.

Comment

The four hunting camp deaths occurred to infants who had been in contact with nursing stations because of repeated episodes of illness which included respiratory infection, otitis media and gastroenteritis. One infant had undergone major surgery shortly after birth; this initiated the need for constant medical care in hospital and nursing stations and as an outpatient. Her progress was also complicated by social neglect and placement in two successive foster homes. She was finally taken to a hunting camp where, after a short bout of respiratory illness complicated by diarrhoea, she died when adverse weather conditions prohibited return to a settlement. In only one of these cases had a nurse remonstrated with a family in an effort to prevent the taking of a vulnerable infant into a hostile environment away from a settlement.

The remaining 8 respiratory deaths are of considerable interest; 4 died in nursing stations, 2 died within a few hours of admission to a hospital with full medical facilities, and 2 died during air evacuation to hospital. The single feature common to these deaths was that the infants had been under regular nursing supervision, and even active care - on an out patient basis - prior to their final collapse and death. The following illustrates the nature of such care.

Respiratory Death In Baby Attending Nursing Station

The infant concerned was born to a 29 year old Inuit mother who had a history of a perinatal death. The infant received regular Well Baby Care and immunization. She was the victim of diarrhoea at 5 months, otitis media at 6 months, anaemia at 7 months, and otitis media again at 8 months.

The fatal respiratory tract infection began at age ten months and she was placed on an antibiotic. Two days later the infant appeared better but with the chest still congested. A further two days later the chest was still "congested" and she was started on another antibiotic. The following day, the infant being still no better, the dose was increased. The infant was admitted to the nursing station late in the evening of that day in a terminal state and died within a few hours. Radio telephone contact for medical advice was completed with difficulty about one hour before death.

The baby was under regular nursing supervision during the six days of this illness. In spite of adequate doses of two different antibiotics, the condition of the baby did not improve. No autopsy was obtained.

Committee Conclusions

It was strongly recommended that a doctor's consultation by radio and evacuation should have been considered on the third or fourth day of illness. The baby should have been admitted earlier to the nursing station for observation.

Comment

The biggest problem in the management of such infants is the recognition of that point in time when a relatively minor complaint becomes a serious illness likely to result in death.

This general situation is complicated further by the difficulty or reluctance of nurses to admit sick infants to the nursing station for observation. In one case the nurse concerned was single-handed and in another the nursing station was undergoing renovation. Facilities existed at nearly all nursing stations for short term nursing care and observation but these facilities were somewhat removed from nurses' living quarters, and a single-handed nurse would have to sleep in the room with the infant if it was to receive attention during the night. The choice was not always an easy one.

It is evident from reviewing the record that these deaths were not sudden and in the majoritv, ample time for medical consultation and air evacuation was available if only the seriousness of the condition had been realized.

Finally it should be stressed that even now we have little knowledge of the bacteriology or virology of respiratory infection in the infant deaths or in those who survive. This is a fruitful field for research.

MENINGITIS

Three deaths due to meningitis occurred in Inuit infants between the third and fifth months of life. Two deaths occurred where the diagnosis was confirmed by lumbar puncture. In a third case, the infant suffered from a chromosomal anomaly. Based on symptoms which included back and neck stiffness, the diagnosis was presumed to be meningitis and was reported to the nurse by telephone from a remote camp. This infant died four days later having received only temporary symptomatic benefit from aspirin.

The two confirmed cases mentioned occurred in infants under medical supervision. Both babies were examined by physicians as well as nurses. In all cases there was delay in making the diagnosis and this delay contributed to the fatal outcome in each.

GASTROENTERITIS

Three deaths, all Inuit female infants, were caused by gastroenteritis. The deaths occurred at 18 days, one month and five months. Two of the infants had been breast fed for two to three weeks, the third had received no breast feeding. One infant was evacuated to a hospital with adequate physician and nursing care, and in the other two cases it would appear the gravity of the illness was not recognised until each infant was beyond medical help. This is apparent from the following case summary.

A Death At Home From Gastroenteritis

This infant was delivered at term to a multiparous Inuit mother. The infant was delivered in hospital without complications and returned home with her mother.

At age six months, the baby developed acute gastroenteritis and was seen at the nursing station twice in the afternoon on the day of onset. The following morning the baby was returned to the nursing station having been dead for some time. There was evidence of drinking in the home at the time of death.

Committee Conclusions

With the advantage of hindsight, it is now apparent that three things might have saved the baby's life if they had been instituted at the late afternoon visit. The infant could have been admitted to the nursing station and received intravenous therapy. Telephone consultation with a physician might also have been of some benefit. A home visit may have revealed the true state of affairs, which was one bordering on child neglect at the time of death.

CONGENITAL MALFORMATIONS

Congenital defects were present in four of the post perinatal deaths. All affected infants were male, two born of Inuit mothers and two born of Indian mothers. The age at death ranged from one to five months. Three infants died from congenital heart disease, the other from diaphramatic hernia. One of those with heart defects had coarctation of the aorta which was potentially treatable and was undiagnosed prior to autopsy. The infant suffering from diaphragmatic hernia survived to the age of four months and died after undergoing operative repair in a Southern referral centre.

SUDDEN INFANT DEATHS

There were 8 sudden infant deaths in the study, 5 Inuit and 3 Indian infants. The age at death varied between the eighth and twentieth weeks with a mean age of 14 weeks. Five male and 3 female infants died in this group. Autopsies were performed on all of the infants. Evidence of respiratory infection, usually minimal, was found in 3 autopsies. A skull fracture together with bronchiolitis was found in one case, with non specific findings in the remaining three cases. Evidence suggesting overlaying as a contributing factor was present in 5 of the 8 autopsies.

Five of the 8 sudden infant deaths involved sleeping in the same bed as the parents. In one case the parents and two older children slept in the same bed with the infant. In three of these cases there was definite evidence of the heavy use of alcohol by one or both parents on the day of death.

Comment

The overall incidence of sudden infant deaths in this study was 8/1000 live births. Eliminating the White population which had no such deaths, the incidence in the Native population was closer to 10/1000 live births. The incidence of this cause of death is variously reported as between 2-3 deaths/1000 live births. The British Department of Health survey of 669 post neonatal deaths showed the rate to be 2/1000 live births (D.H.S.S. 1970), and Tonkin (1975) in Auckland, New Zealand reported a rate of 19/1000 live births; however, to a large extent these figures relate to sudden unexplained infant deaths and hence usually would discount many of the sudden infant deaths reported in this study. The incidence of sudden infant deaths in the Northwest Territories was therefore about five times that usually recorded in North America and the U.K. This increase is probably due to deaths from suffocation by an adult overlaying the infant who is sleeping in the same bed. This cause of cot deaths has been largely discounted by other workers. Richards and McIntosh (1972) in a study of 226 consecutive infant deaths in Glasgow found evidence of overlaying in only 5 out of 79 cot deaths.

GENERAL DISCUSSION AND CONCLUSIONS

The small number of deaths prevents any in depth statistical analysis of the data presented in this chapter. The chapter "Predictors of Mortality and Morbidity" (Chapter 9) presents some information about underlying factors associated with mortality and morbidity and it is unnecessary to repeat these here. It is worthwhile to note that although relationships were weak, the most important characteristics associated with infant mortality were (a) the social and environmental circumstances in which the infant lived, notably living in remote bush camps or having parents who abused the use of alcohol; and (b) a failure on the part of parents or medical personnel to recognize the seriousness of an illness. The causes of death were more in keeping with those of a developing country rather than the rest of Canada. Infectious diseases were the most common causes of death and accounted for 18 of the 33 post neonatal deaths. This is a rate of 1528/100000 live births and can be compared to a rate of 114/100000 live births for Sherbrooke, Quebec in 1970-1971 (Puffer and Serrano, 1973) but is similar to that found in large cities in South America.

A factor showing only a small, but beneficial, association with mortality was the frequency of breast feeding. Graham-Cumming (1967) in his study of infant death among Canadian Registered Indians showed that breastfed infants had a mortality rate appreciably lower than bottle fed infants. Plank and Milanesi (1973) showed that among Chilean infants there were three times as many deaths among babies given bottles before the age of three months as among those who were wholly breast fed. Puffer and Serrano (1973), using data collected by the Inter American Investigation of Mortality in Childhood, demonstrated the importance of breast feeding in reducing infant mortality. The present study has insufficient data to comment upon the role of breast feeding in the prevention of mortality; however, as is documented in Table 7-45, breast feeding was positively associated with reduced morbidity and better general overall health. Of the 33 post-perinatal deaths, only 4 were wholly breastfed, 8 infants were both breast and bottle fed, 11 bottle fed only and there is no information regarding the nutrition of the other 10 infants.

Although it is difficult to write confidently about underlying factors contributing to these deaths, it is altogether too clear that a number of them were preventable. A lesson learned from many of these deaths is the rapidity with which a supposedly "healthy" or only "mildly ill" child can become seriously ill and die. The recognition of the ill child is in some ways an art, but it is more so a science with objective measurable parameters. Both the science and the art must be taught to all medical personnel working with children anywhere, but in the North, where laboratory facilities are few, help is hours away and anticipation must be a key word, this education is especially important.

CHAPTER 7

NUTRITION

by D.W. Spady and O. Schaefer

INTRODUCTION

Good nutrition in infancy is perhaps the single most important factor which influences the growth and health of the infant. Studies done throughout the world have documented the importance of good nutrition during this critical first year of life (Grulee, 1935; Mata, 1978; Plank and Milanesi, 1973). These and other studies have demonstrated the changes in infant feeding patterns which occur within a culture when it is exposed to another, more aggressive culture. This chapter will present the findings of the present study and will document the important effects that infant feeding practices can have on health.

TRADITIONAL INFANT FEEDING PATTERNS

MILK FEEDING

Only sketchy information of traditional infant feeding practices is available. The explorers and missionaries in the Arctic around the turn of the century were more interested in the material culture, social organization and religious beliefs of the Native peoples than they were in infant feeding. The feeding of infants probably was not that far removed from that of their own upbringing. However the writings of Parry (1835), Mauss (1904), Jenness (1922), and Stefansson (1956) do attest to the Inuit habit of nursing infants until the next child was born.

Feeding on demand rather than at set intervals was and still is the rule, especially for breastfed infants. In the ideal protection of the Inuit amauti (mother's parka), where the baby just moved from the back forward to the breast, suckling was easily accomplished in the harsh cold world of an igloo or while sitting on a dogsled. Lactation was commonly prolonged for two to four years and occasionally even five years; so most children in traditional times enjoyed an undisturbed mother's milk supply for the first three years of life. This long period of lactation provided the child with a good supply of protein, vitamins, and minerals, as well as furnishing immunoglobulins to enhance his developing immunological defense mechanisms. Mother's milk was also the main source of calcium for the first two to three years of life, when requirements were high and could not yet be filled from that main traditional dietary source of the Northern Natives, the chewing of spongious bones.

Prolonged lactation not only fulfilled the essential nutrient requirements for the first years of life, it also effected proper spacing of children, allowing the mother to nurse and concentrate attention on one child for an average of three years. Stefansson (1956) confirmed the claims of earlier explorers that Inuit families were small and that this was primarily due to a low total fecundity of Inuit women (compared with European populations of that time). He related this to the prolonged lactation habits, and more tangible proof was provided by Schaefer (1959), and Hildes et al (1973) in Canada, and Berman et al (1972) with Alaskan Inuit, who found a direct relationship of duration of breastfeeding and post partum amenorrhoea and conception delay.

Suckling has been found to reinforce the complex neuro-endocrine regulation process delaying the return of ovulation and menstruation (Minaguchi and Meites, 1967; Tyson 1977). Inuit infants were carried skin to skin in the amauti and had easy access to the mother's breast which they suckled frequently, either in response to thirst or hunger or just for oral gratification and infant/maternal contact needs. This likely helped to delay post partum ovulation and conception (Schaefer, 1971).

SUPPLEMENTARY FEEDING

In both the Inuit and Indian traditional infant feeding practices, supplemental foods were added between four and six months of age. The first food was usually very small amounts of fish, liver or meat, preferably organ meat such as liver and kidneys from caribou, hare, ptarmigan and seal. By custom the mother would premasticate such food items and transfer small amounts in a pulpy semi-liquid form into her infant's mouth, taking back whatever the baby rejected. Only when teeth developed were small pieces of family food given for the infant to chew on.

DETERMINANTS OF CHANGE

The early explorers made no lasting impact on the life style and nutritional habits of the Native groups met in the Canadian North. More significant was the impact of the fur traders penetrating along lakes and streams from the South, and whalers invading the Arctic from the East and West during the second half of the last century on until approximately World War I.

Introducing trapping, guns, and the food staples required to keep hunters on the trapline, the traders and whalers disturbed the seasonal hunting and migration patterns. They also facilitated the spread of new diseases and deadly epidemics by attracting large population concentrations around trading posts and ships. This in turn produced a population often too listless to be capable of pursuing the increasingly scarce game, and resulted in local famines. Fortunately, at that time, there was little or no immediate change in the infant feeding practices and their nutritional status was affected directly only when their mothers suffered from famine or disease sufficiently to compromise lactation.

Health service personnel, along with other White agencies, preoccupied with the prevention of infectious diseases, particularly tuberculosis, discouraged the transfer of premasticated food from mother to infant. This, plus the introduction of pablum and other commercial baby foods, gradually displaced the traditional Native methods of introducing supplementary foods to their infants. The change began more than thirty years ago in most Indian and Western Arctic communities and some twenty years ago in the Central and Eastern Arctic.

No single event had a more immediate impact on the Canadian North than the construction and maintenance of the Distant Early Warning (DEW) Line. A massive influx of material and men occurred over a two year period (1955-57). Spreading across the Arctic from Alaska to Greenland, it influenced the Inuit groups of the entire Canadian Arctic, drawing them from their hunting camps to the DEW Line sites.

Government agencies tried to cushion the effects of this event and minimize exploitation and social destruction by tightly regulating contacts of Inuit and transient workers. At the same time they went into frantic activity to cushion and accommodate the Native population to the inevitable changes. Within a decade there were practically no nomadic hunters left, with virtually all people in permanent housing around trading posts, schools, and the net of nursing stations extending into all but the smallest settlements.

Infants were particularly affected by the changes. In the years 1951-54, infant mortality for NWT Inuit was 164/1000 live births but in the period 1955 to 1958 it rose to 232/1000 live births (D.N.H.W., 1961). Increased infection pressure and social upheaval no doubt were partly responsible for this increase, but another very important factor was a change in the infant nutrition patterns. With the DEW Line construction and the life in the settlements came a massive and relatively sudden change from breastfeeding to bottlefeeding; a mode rarely practiced prior to 1955 and then only in the larger settlements.

The increasing world demand for mineral resources is imposing a new problem on the Northern citizen. Major developments in mining, oil and transportation will likely further increase acculturation pressure with a concurrent decline of traditional habits and social structures. The effects on the nutritional patterns of the Northern Native by major exploration and settlement are hard to predict, but the experience from around the world suggests that the traditional methods soon yield to the modern trends.

THE STUDY POPULATION

For this nutrition study, it was decided to concentrate on only those infants who would have data available for the full first year of life and to exclude those who died in the perinatal period or moved out of the NWT during that first year. The composition of the study group is presented in Table 7-1, which used the classification of ethnicity described in Chapter 3.

Table 7-1
COMPOSITION OF INFANTS BY ETHNICITY AND ZONE OF RESIDENCE

	INUIT	INDIAN	WHITE	MIXED	OTHER	TOTAL
Baffin	200	--	16	12	--	228
Inuvik	45	74	39	15	9	182
Mackenzie	79	172	205	35	17	508
Keewatin	109	--	8	3	--	120
Total	433	246	268	65	26	1038

The tables, wherever used, will state the sample size. It is difficult to comment with confidence about the Other group as the numbers involved are small. The data will be presented but the group itself will not be discussed generally.

A nutrition questionnaire was completed for each child at the sixth and twelfth months of age by the public health nurse. These established information about the infant's feeding patterns and some background information of the family nutritional standards.

The specifics presented in the following pages are largely derived from this questionnaire. Table 7-2 shows the population concerned as 1038, those completing at least part of the questionnaire as 941, and presents the breakdown by ethnicity of child.

Table 7-2
COMPLETION OF NUTRITION QUESTIONNAIRE BY ETHNIC STATUS OF CHILD

	INUIT	INDIAN	WHITE	MIXED	OTHER	TOTAL
Number	433	246	268	65	26	1038
Data Available	409	208	244	61	19	941
Percent Completed	94.5	84.6	91.0	93.8	73.1	90.6
No Data	24	38	24	4	7	97

Inaccessability within the Territories accounted for the main bulk of losses. The base value of 941 may not always be the base value for a specific table; this is because not all questions were answered in each questionnaire.

MILK FEEDING

Breast milk has been the traditional "first food" of the Native infant, but as seen in Table 7-3 the use of this ideal food had considerably declined by the time of this study. Of the 939 infants reported, only 476 (50.7%) were breastfed at all, while 49.3 percent were bottlefed only. Of the 476 breastfed infants, 113 (23.7%) were breastfed for less than one month. Thus, of the 939 infants for which there is information, only 38.6 percent were breastfed for a significant period of time.

Table 7-3
STATUS OF BREAST FEEDING BY ETHNIC GROUP OF CHILD

Ethnicity of Child	No Breast Feeding		Breast Fed Less Than One Month		Breast Fed More Than One Month		Average Dur. Of Br. Feed. If Br. Fed		No Data
	N	%	N	%	N	%	N	(Months)	
Inuit	156	38.2	53	13.0	199	48.8	408	5.3	25
Indian	138	66.7	18	8.7	51	24.6	207	3.6	39
White	124	50.8	29	11.9	91	37.3	244	3.0	24
Mixed	31	50.8	10	16.4	20	32.8	61	2.7	4
Other	14	73.7	3	15.8	2	10.5	19	0.8	7
Subtotal	463		113		363		939		99
Total	463			476			939		

The practice and duration of breastfeeding varied with the ethnic origin of the child. The Inuit infant was more likely to be breastfed, and to be breastfed longer, than was the infant of any other cultural group. Of the Inuit infants, 62 percent were breastfed, 48.8 percent being breastfed for greater than one month with the average duration of breastfeeding at 5.3 months. Only 33 percent of Indian infants were breastfed, 25 percent for more than one month, however the average duration of breastfeeding was 3.6 months.

Of the 268 White infants, 120 (49.2%) were breastfed with an average duration of 3.0 months. The same (49.2) percentage of infants of Mixed parentage were breastfed, but fewer were breastfed longer than one month and the average duration of breastfeeding was a slightly shorter 2.7 months.

The use of non-human milk as a mode of infant feeding is indicated in Table 7-4.

Table 7-4

TYPE OF FORMULAS USED BY ETHNIC GROUPING OF CHILD

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
FORMULA	N	%	N	%	N	%	N	%	N	%	N	%
None	29	7.3	3	1.5	11	4.6	--	--	--	--	43	4.7
Evap Milk	293	73.8	163	78.7	88	36.7	34	56.7	7	38.8	585	63.4
Powder	33	8.3	--	--	5	2.1	4	6.7	1	5.3	43	4.7
Evap+Powder	22	5.5	7	3.4	7	2.9	2	3.3	--	--	38	4.1
Other	8	2.0	15	7.3	86	35.8	13	21.7	6	31.6	128	13.9
Evap+Other	11	2.8	17	8.2	28	11.7	7	11.7	3	15.8	66	7.1
Powder+Other	-	--	2	1.0	12	5.0	--	--	1	5.3	15	1.6
Evap+Powder+ Other	1	0.3	--	--	3	1.3	--	--	1	5.3	5	0.5
Total	433		246		268		65		26		1038	
No Data	36		39		28		5		7		115	

The rapid spread of bottlefeeding by Native mothers during recent years is a phenomenon probably attributable to a number of factors such as: acculturation to trends exhibited by the majority culture, increased availability of milk and other infant food substitutes, and an increased rate of children born to unwed mothers and then adopted and cared for by relatives. The following statistics and text explain some of these factors.

Infant formulae in common use were those of evaporated full-cream milk, whole cream powdered milk, proprietary infant formulae, or combinations. Native children were more commonly fed evaporated and powdered milk preparations, while the White child usually received proprietary products. Table 7-4 summarizes these observations.

In all ethnic groups, some infants were fed both breast milk and formula at the same time. This may have represented the weaning process to some degree, however, it probably just illustrated the increasingly common practice of supplementing the breastfed infant with another milk product. This innovation was most obvious among the Inuit where, at age one month, one quarter of breastfed infants and by age 5 months half, were being supplemented with formula. Nevertheless, it must be remembered that very few infants in the other ethnic groups were even breastfed. Table 7-5 summarizes the information relating to the breast and formula feeding of the Inuit infant.

Table 7-5
INUIT
BREAST AND BOTTLE FEEDING COMPARED BY EACH MONTH OF LIFE

Age	Breast		Bottle		Breast Only		Bottle Only		Both		N
(months)	N	%	N	%	N	%	N	%	N	%	
Birth*	252	61.8	250	61.3	158	38.7	156	38.2	94	23.0	408
1	188	48.0	248	63.3	144	36.7	204	52.0	44	11.2	392
2	156	39.8	284	72.4	108	27.6	236	60.2	48	12.2	392
3	127	32.4	314	80.1	78	19.9	265	67.6	49	12.5	392
4	110	28.1	327	83.4	65	16.6	282	71.9	45	11.5	392
5	101	25.8	341	87.0	51	13.0	291	74.2	50	12.8	392
6	84	21.4	349	89.0	43	11.0	308	78.6	41	10.5	392
7	79	20.2	352	89.8	40	10.2	313	79.8	39	9.95	392
8	75	19.1	353	90.1	39	9.9	317	80.9	36	9.2	392
9	69	17.6	356	90.8	36	9.2	323	82.4	33	8.4	392
10	59	15.1	361	92.1	31	7.9	333	84.9	28	7.1	392
11	56	14.3	363	92.6	29	7.4	336	85.7	27	6.9	392
12**	50	12.8	364	92.9	28	7.1	342	87.2	22	5.6	392

* For this age only, data derived from alternate source and N=408.

** The questionnaire does not allow for information past 12 months, therefore the information for the 12th month may not be accurate.

This information was derived from contingency tables comparing "Duration of Breast Feeding" with "Age of Introduction of Bottle Feeding". Similar tables for the Indian, White, and Mixed infants may be found in (Tables 7-6, 7-7, 7-8).

Table 7-6
INDIAN
BREAST AND BOTTLE FEEDING COMPARED BY EACH MONTH OF LIFE

Age	Breast		Bottle		Breast Only		Bottle Only		Both		N
(Months)	N	%	N	%	N	%	N	%	N	%	
Birth*	69	33.3	168	81.2	39	18.8	138	66.7	30	14.5	207
1	40	20.2	163	82.3	35	17.7	158	79.8	5	2.5	198
2	30	15.2	172	86.9	26	13.1	168	84.8	4	2.0	198
3	24	12.1	179	90.4	19	9.6	174	87.9	5	2.5	198
4	18	9.1	185	93.4	13	6.6	180	90.9	5	2.5	198
5	15	7.6	187	94.4	11	5.6	183	92.4	4	2.0	198
6	10	5.1	189	95.5	9	4.5	188	94.9	1	0.5	198
7	U/C	--	U/C	--	U/C	--	U/C	--	U/C	--	198
8	8	4.0	191	96.5	7	3.5	190	96.0	1	0.5	198
9	U/C	--	U/C	--	U/C	--	U/C	--	U/C	--	198
10	5	2.5	193	97.5	5	2.5	193	97.5	0	--	198
11	U/C	--	U/C	--	U/C	--	U/C	--	U/C	--	198
12**	5	2.5	195	98.5	3	1.5	193	97.5	2	1.0	198

*Data derived from alternate source and N=207.
** The information for the 12th month may not be accurate.
U/C=No data, assumed unchanged from previous month.

Table 7-7
WHITE
BREAST AND BOTTLE FEEDING COMPARED BY EACH MONTH OF LIFE

Age	Breast		Bottle		Breast Only		Bottle Only		Both		N
(Months)	N	%	N	%	N	%	N	%	N	%	
Birth*	120	49.2	173	70.9	71	29.1	124	50.8	49	20.1	244
1	79	33.2	170	71.4	68	28.6	159	66.8	11	4.6	238
2	50	21.0	191	80.3	47	19.7	188	79.0	3	1.3	238
3	29	12.2	209	87.8	29	12.2	209	87.8	0	0	238
4	19	8.0	218	92.0	19	8.0	218	92.0	0	0	237
5	16	6.7	223	93.7	15	6.3	222	93.3	1	0.4	238
6	11	4.6	226	95.4	11	4.6	226	95.4	0	0	237
7	U/C	--	U/C	--	U/C	--	U/C	--	U/C	--	237
8	9	3.8	227	96.2	9	3.8	227	96.2	0	0	236
9	U/C	--	U/C	--	U/C	--	U/C	--	U/C	--	236
10	6	2.5	U/C	--	U/C	--	U/C	--	U/C	--	236
11	2	0.9	228	99.1	2	0.9	228	99.1	0	0	228
12**	2	0.8	U/C	--	U/C	--	U/C	--	U/C	--	228

*Data derived from alternate source and N=244.
** The information for the 12th month may not be accurate.
U/C=No data, assumed unchanged from previous month.

Table 7-8
MIXED
BREAST AND BOTTLE FEEDING COMPARED BY EACH MONTH OF LIFE

Age	Breast		Bottle		Breast Only		Bottle Only		Both		N
(Months)	N	%	N	%	N	%	N	%	N	%	
Birth*	30	49.2	45	73.8	16	26.2	31	50.8	14	23.0	61
1	18	29.5	45	73.8	16	26.2	43	70.5	2	3.3	61
2	16	26.2	47	77.0	14	23.0	45	73.8	2	3.3	61
3	11	18.0	51	83.6	10	16.4	50	82.0	1	1.6	61
4	7	11.5	56	91.8	5	8.2	54	88.5	2	3.3	61
5	4	6.6	59	96.7	2	3.3	57	93.4	2	3.3	61
6	3	4.9	U/C	--	U/C	--	U/C	--	U/C	--	
7	U/c	--	U/C	--	U/C	--	U/C	--	U/C	--	
8	1	1.6	61	100.	0	0	60	98.4	1	1.6	61
9	U/C	--	U/C	--	U/C	--	U/C	--	U/C	--	
10	U/C	--	U/C	--	U/C	--	U/C	--	U/C	--	
11	U/C	--	U/C	--	U/C	--	U/C	--	U/C	--	
12	U/C	--	U/C	--	U.C	--	U.C	--	U/C	--	

* Data derived from alternate source and N=61.
U/C = Unchanged.

FACTORS INFLUENCING BREAST FEEDING

The studies of Woodbury (1922), Grulee et al (1935) and Plank and Milanesi (1973) clearly stress the benefits of breastfeeding and make clear the hazards of bottlefeeding, especially in a poor environment. With these thoughts in mind, the demonstrated decline in breastfeeding among the Inuit and Indian children was of great concern, and so it was important to define the factors associated with this decline by a more detailed analysis.

The practice and duration of breastfeeding will be discussed in relationship to the following factors:

a. Ethnicity of mother - this has been alluded to by comparing feeding practices with ethnicity of the child.

b. Family food source.

c. Age of the mother.

d. Birthweight of the infant.

e. Alcohol consumption by the mother.

f. Place of birth.

g. Zone of birth.

h. Population of mother's place of residence.

Family Food Source

A factor associated with the practice of breastfeeding in the Inuit group of infants was that related to the major food source of the family being "mainly store", "half store-half native",or "mainly native" food.

Within the Inuit group more infants were breastfed, and breastfed for longer than one month, where the family relied on a "mainly native" food source. The mothers of those families relying on a "mainly store" food source did not breastfeed their children as commonly nor for as long a period of time. Table 7-9 shows that in families whose major food source is "mainly store" only 43.6 percent of infants were breastfed as compared with the 67.2 percent of infants being breastfed in families living on a "mainly native" diet. This is not surprising and in keeping with a general observation made throughout the world that breastfeeding is more common among these families living the traditional Native lifestyle. No such relationship was observed in the other ethnic groups.

Table 7-9
INUIT - BREAST FEEDING COMPARED BY MAJOR FOOD SOURCE OF FAMILY

Breast Feeding	Mainly Store		Half Store Half Native		Mainly Native		Total	
	N	%	N	%	N	%	N	%
None	48	56.5	84	33.9	23	32.9	155	38.5
Less than 1 month	10	11.8	36	14.5	6	8,6	52	12.9
More than 1 month	27	31.8	128	51.6	41	58.6	196	48.6
Total	85		248		70		403	

No Data = 30
Chi-Square = 17.55 $p<0.01$

Age of the Mother

Table 7-10 compares the duration of breastfeeding with the age of the mother. It can be seen that as the mother's age increases, so does the frequency and duration of breastfeeding. These observations can be partly explained by the observation that:

a. Native women constitute the majority of older mothers.

b. Older mothers have closer ties with the traditional practices.

c. Older mothers are more likely to have breastfed earlier children and hence would breastfeed the present child.

Table 7-10
PRACTICE OF BREAST FEEDING COMPARED BY MATERNAL AGE

	Age	<19		20 - 30		30+		TOTAL	
		N	%	N	%	N	%	N	%
Breastfed	Yes	73	42.0	278	51.0	125	57.3	476	50.8
	No	101	58.0	267	49.0	93	42.7	461	49.2
Total		174		545		218		937	

No Data = 101
Chi-Square = 9.19 $p<0.05$

Tables 7-11 to 7-14 show that the relationship of breastfeeding with maternal age is most marked with the Inuit, where an increase in mother's age is strongly associated with the practice of breastfeeding. In the Indian and Mixed populations similar relationships hold, but in the White population mothers between ages 20-30 years breastfed more often than other mothers, reflecting the recent trend back to breastfeeding among better educated North Americans.

Table 7-11
INUIT - PRACTICE OF BREAST FEEDING COMPARED BY MATERNAL AGE

	Age	<19		20 - 30		30+		TOTAL	
		N	%	N	%	N	%	N	%
Breastfed	Yes	49	52.7	132	61.4	71	71.0	252	61.8
	No	44	47.3	83	38.6	29	29.0	156	38.2
Total		93		215		100		408	

No Data = 25
Chi-Square = 6.87 $p<0.05$

Table 7-12
INDIAN - PRACTICE OF BREAST FEEDING COMPARED BY MATERNAL AGE

	Age	<19		20 - 30		30+		TOTAL	
		N	%	N	%	N	%	N	%
Breastfed	Yes	10	25.0	36	21.5	23	53.1	69	33.3
	No	30	75.0	82	69.5	26	46.9	138	66.7
Total		40		118		49		207	

No Data = 39
Chi-Square = 5.75 $0.05<p<0.10$

Table 7-13
WHITE - PRACTICE OF BREAST FEEDING COMPARED BY MATERNAL AGE

	Age	<19		20 - 30		30+		TOTAL	
		N	%	N	%	N	%	N	%
Breastfed	Yes	8	36.4	99	53.5	13	35.1	120	49.2
	No	14	63.6	86	46.5	24	64.9	124	50.8
Total		22		185		37		244	

No Data = 24
Chi-Square = 5.75 0.05<p<0.10

Table 7-14
MIXED - PRACTICE OF BREAST FEEDING COMPARED BY MATERNAL AGE

	Age	<19		20 - 30		30+		TOTAL	
		N	%	N	%	N	%	N	%
Breastfed	Yes	7	58.3	16	40.0	8	88.9	31	50.8
	No	5	41.7	24	60.0	1	11.1	30	49.2
Total		12		40		9		61	

No Data = 4
Chi-Square = 7.36 p<0.05

This finding is disturbing as it reflects a relatively greater departure from traditional infant feeding patterns by the young Native mother, foreboding an even greater decline of breastfeeding in the future. This, in a changing culture, is fraught with misunderstanding, misinformation, and misuse, all leading to a higher risk of malnutrition.

Birthweight of the Infant

Table 7-15 compares the birth weight of the baby with the practice of breast feeding. The low birth weight (LBW) infant is less commonly breastfed than is a heavier infant.

Table 7-15
BIRTH WEIGHT COMPARED BY PRACTICE OF BREAST FEEDING

		<2500 gm		2501-3000 gm		>3000 gm		TOTAL	
		N	%	N	%	N	%	N	%
Breastfed	Yes	16	23.9	113	53.3	348	54.0	477	51.7
	No	51	76.1	99	46.7	296	46.0	446	48.3
Total		67		212		644		923	

No Data = 115
Chi-Square = 22.39 p<0.001

This may be because the LBW infant is possibly premature, more likely to remain in hospital for a longer period of time, and may be transported to a larger centre for treatment. Another factor is that LBW infants are more often born to teenage mothers, who are less inclined to breastfeed. The LBW infant is more likely to be separated from his mother and hence the opportunity for breastfeeding is lost. This is understandable and probably unavoidable, but is unfortunate as recent workers advocate the use of breast milk to protect the premature from illness and gastro-intestinal infection as well as providing him with a nutritionally suitable milk (Jelliffe 1978, Welsh and May, 1979). Additionally, it permits the mother to play an acitve role in the care of her premature child, thus promoting the development of strong maternal bonding. For these reasons, and where possible, the mother should be strongly encouraged to breastfeed her premature infant.

Alcohol Consumption by the Mother

Alcohol consumption and alcohol abuse is an increasing problem in the Northwest Territories. The 1970 Report on Health Conditions in the Northwest Territories (D.N.H.W., 1971) stated: "A fair percentage of our morbidity in infants and children is related to alcohol problems in the families, with subsequent neglect of children, but this is difficult to prove." Data from the present study have shown alcohol consumption to be a contributing factor in the deaths of a number of infants.

The relationship between alcohol consumption and infant morbidity is included in the chapter discussing socio-economic correlates of morbidity (Chapter 9); however, since breastfeeding is considered as a very important factor in optimum infant nutrition and also important in reducing morbidity in infants, the degree which the practice of breastfeeding was related to alcohol consumption is further examined here.

Table 7-16 shows that 51 percent of mothers who "never" consumed alcohol, breastfed their children for at least one month.

Table 7-16
ALCOHOL CONSUMPTION AND PRACTICE OF BREAST FEEDING

Duration of Breast Feeding	Never Drinks		Drinks, Never Intoxicated		Drinks, Gets Intoxicated		Total	
	N	%	N	%	N	%	N	%
None or <1 Month	167	48.8	193	65.0	155	72.1	515	60.3
More than 1 Month	175	51.2	104	35.0	60	27.9	339	39.7
Total	342		297		215		854	

No Data = 184
Chi-Square=34.01 P<0.001

Duration of Breast Feeding if Breast Fed	Non-Drinker	Drinker
>1 Month Mean (S.D.)	6.58 (4.07)*	4.56 (3.33)*
N=	173**	162**

*Difference Between These Values is Statistically Significant
t=4.98 p<0.001

** The reader may note that these values are not exactly the same as the values given for "more than one month". This is because although it is known the infants were breastfed for greater than one month, the exact duration was not recorded.

This percentage can be compared with the 35 percent of those mothers who were moderate drinkers, and the 28 percent for those who drank to the point of intoxication. For the mothers who breastfed their children for at least one month, the average duration of lactation among the non-drinking mothers was 6.6 months, as opposed to 4.6 months for the drinking mothers.

When the above factors are subdivided by ethnic origin, the relationships persisted at a high level of significance for the Inuit and White groups, but not for the Indian one, although the trend persisted in this group as well. Tables 7-17, 7-18, and 7-19 present more detailed results.

Table 7-17
INUIT - ALCOHOL CONSUMPTION AND PRACTICE OF BREAST FEEDING

Duration of Breast Feeding	Never Drinks		Drinks, Never Intoxicated		Drinks, Gets Intoxicated		Total	
	N	%	N	%	N	%	N	%
None or <1 Month	97	43.3	29	53.7	64	66.0	190	50.7
More Than 1 Month	127	56.7	25	46.3	33	34.0	185	49.3
Total	224		54		97		375	

No Data = 58

Chi-Square=14.16 p<0.001

Duration of Breast Feeding if Breast Fed >1 Month Mean (S.D.)	Non-Drinker	Drinker
	7.4 (4.1)*	5.35(3.79)*
	N= 127	N= 58

*Difference Between These Values is Statistically Significant t=3.43 p<0.001

Table 7-18
INDIAN - ALCOHOL CONSUMPTION AND PRACTICE OF BREAST FEEDING

Duration of Breast Feeding	Never Drinks		Drinks, Never Intoxicated		Drinks, Gets Intoxicated		Total	
	N	%	N	%	N	%	N	%
None or <1 Month	35	68.6	45	73.8	61	78.2	141	74.2
More Than 1 Month	16	31.4	16	26.2	17	21.8	49	25.8
Total	51		61		78		190	

No Data = 56

Chi-Square=1.49 p>0.05

Duration of Breast Feeding if Breast Fed >1 Month Mean (S.D.)	Non-Drinker	Drinker
	5.83 (4.13)*	4.87 (3.33)*
	N = 12**	N = 30**

*Difference Between These Values is Not Statisticaly Significant t=0.72 p>0.05

** The reader may note that these values are not exactly the same as the values given for "more than one month". This is because although it is known the infants were breastfed for greater than one month, the exact duration was not recorded.

Table 7-19
WHITE - ALCOHOL CONSUMPTION AND PRACTICE OF BREAST FEEDING

Duration of Breast Feeding	Never Drinks		Drinks, Never Intoxicated		Drinks, Gets Intoxicated		Total	
	N	%	N	%	N	%	N	%
None or <1 Month	23	47.9	90	61.6	21	87.5	134	61.5
More than 1 Month	25	52.1	56	38.4	3	12.5	84	38.5
Total	48		146		24		218	

No Data = 50
Chi-Square=10.59 P<0.01

Duration of Breast Feeding if Breast Fed	Non-Drinker	Drinker
>1 Month Mean (S.D.)	4.08 (2.81)*	3.76 (2.77)*
	N = 25	N = 58**

*Difference Between These Values is Not Statistically Significant t=0.48 p>0.05

** The reader may note that these values are not exactly the same as the values given for "more than one month". This is because although it is known the infants were breastfed for greater than one month, the exact duration was not recorded.

The overall impression is that the woman who drinks is less likely to breastfeed her infant, and should she feed him, she will do so for a shorter period of time than the mother who does not drink. The conclusion could be drawn that alcohol consumption adversely influences the practice of breastfeeding. This is a reasonable conclusion and possibly correct; however, the data could also reflect the presence of a third variable, one which influences both the practice of breastfeeding and alcohol consumption. Such a variable, not defined specifically in the study, but referred to indirectly by multiple variables, is urbanization. The information following illustrates to some extent the relationship of breastfeeding with urbanization.

Place of Birth

Much anecdotal information was available to suggest that infants born in hospitals were likely to be bottlefed even if the mothers wanted to breastfeed; thus it became important to determine if hospital delivery was detrimental, at least to the onset of breastfeeding. The results show (Table 7-20) that infants born in hospital were less commonly breastfed than infants born in a nursing station or elsewhere; however, the difference was not statistically significant. Among those born in hospital, 49.4 percent were breastfed whereas 59.3 percent of infants born in a nursing station or at home were breastfed.

Table 7-20
PRACTICE OF BREAST FEEDING COMPARED BY PLACE OF BIRTH

		Nursing Station		Hospital		Total	
		N	%	N	%	N	%
Breastfed	Yes	99	59.3	372	49.4	471	51.2
	No	68	40.7	381	50.6	449	48.8
Total		167		753		920	

No Data = 118
Chi-square = 5.34 $0.05 < p < 0.10$

This relationship suggests the child born in a hospital is less likely to be breastfed than is one born in a nursing station; however, Inuit mothers constituted a large proportion of the mothers having their child delivered in nursing stations and they generally were more predisposed to breastfeeding. If one eliminates the Inuit from the above table the relationship between breastfeeding and place of birth becomes even less likely.

Zone of Residence of the Mother

The zone of residence of the mother appeared to be an important factor influencing the practice of breastfeeding. Preliminary analysis, not considering the ethnic origin of the mother, supported this view. In the Inuvik and Mackenzie zones, only 45 percent of the mothers breastfed their infants, whereas in Baffin and Keewatin, 56 percent and 74 percent respectively practiced breast feeding. These findings are summarized from Table 7-21.

Table 7-21
PRACTICE OF BREAST FEEDING COMPARED BY ZONE OF MOTHER'S RESIDENCE

		BAFFIN		INUVIK		MACKENZIE		KEEWATIN		TOTAL	
		N	%	N	%	N	%	N	%	N	%
Breastfed	Yes	120	55.8	69	44.2	195	45.2	87	73.7	471	51.2
	No	95	44.2	87	55.8	236	54.8	31	26.3	449	48.8
Total		215		156		431		118		920	

No Data = 118
Chi-Square = 34.95 $p<0.001$

With the ethnic origin of the mother considered, this relationship ceases to be significant for all except the Inuit. In this instance, (Table 7-22), contingency table analysis still shows a significant (<0.01) relationship between breastfeeding and zone of residence.

Table 7-22
INUIT - PRACTICE OF BREAST FEEDING COMPARED BY ZONE OF MOTHER'S RESIDENCE

		BAFFIN		INUVIK		MACKENZIE		KEEWATIN		TOTAL	
		N	%	N	%	N	%	N	%	N	%
Breastfed	Yes	106	56.7	18	43.9	50	68.5	78	72.9	252	61.8
	No	81	43.3	23	56.1	23	31.5	29	27.1	156	38.2
Total		187		41		73		107		408	

No Data = 25
Chi-Square=14.6 p<0.01

In Keewatin, 73 percent of Inuit mothers breastfed their infants, in Baffin 57 percent, and in Mackenzie approximately 68 percent of mothers breastfed their infants, but in the Inuvik zone only 44 percent did so.

Keewatin was a relatively remote part of the North and life styles continued in their traditional patterns more easily than in the other zones. Just the opposite held for Inuvik which was the most accessible part of the Arctic; the Inuit living there had been subjected for a longer time and more extensively than other Inuit to the process of acculturation.

It is possible to analyse the data using partial correlation analysis to detect significant variables related to the practice and duration of breastfeeding as practiced by Inuit mothers in these two zones. In the Keewatin zone the practice of breastfeeding was significantly ($p<0.05$) and positively correlated with: increasing maternal age, increasing birth weight of the infant, marriage, and number of prenatal visits. It was also noted that the probability of a mother breastfeeding her infant was lessened if she smoked or if she was employed outside the home. This is in contrast to the Inuvik zone in that a significant positive correlation was observed only from the birth weight of the child, and there were no negative relationships observed. The lack of relationships may be attributed to the fact that there was only a small number (N=41) of Inuit mothers in the Inuvik zone, whereas there was a relatively large number (N=107) in the Keewatin zone, and also to the possibility that the Inuit women living in the Inuvik zone were a more heterogeneous group of individuals.

Population of Mothers Residence

Table 7-23 shows the practice of breastfeeding to be significantly and inversely related to the population size of the mothers' place of residence.

Table 7-23
PRACTICE OF BREAST FEEDING COMPARED BY POPULATION OF MOTHER'S RESIDENCE

		< 1000 People		> 1000 People	
		N	%	N	%
Breastfed	Yes	305	61.46	162	38.4
	No	192	38.6	260	61.6
	Total	497		422	

No Data = 119
Chi Square = 48.22 p<0.001

In communities of less than 1000 individuals nearly 61 percent of mothers breastfed their infants. This contrasted to mothers living in communities of greater than 1000 where only 38 percent breastfed their infants. When the mother's ethnic origin was considered, the relationship between breastfeeding and population remained significant for the three major ethnic groups.

SOLID FOODS

The information obtained regarding the introduction of solid foods to infants is summarized in Table 7-24.

Table 7-24
INTRODUCTION OF SOLID FOODS TO INFANTS

	INUIT			INDIAN			WHITE			MIXED		
	Mean Age	S.D.	N.[1]	Mean Age	S.D.	N.	Mean Age	S.D.	N.	Mean Age	S.D.	N.
Pablum	3.4	1.8	379	2.5	1.5	199	1.6	1.0	240	1.9	1.1	60
Biscuits	5.5	1.9	337	5.5	2.4	185	4.4	1.5	222	5.1	1.8	54
Canned Meat	5.7	2.2	321	5.6	2.6	173	4.1	1.7	234	5.3	2.3	56
Fish	6.8	2.3	321	6.8	2.6	168	7.4	2.9	141	7.1	2.5	38
Vegetables	5.7	2.4	336	5.5	2.8	192	3.2	1.4	239	4.6	1.9	58
Other Cereals	5.9	2.7	214	5.8	2.7	134	5.6	3.0	187	5.7	2.9	44
Bread	6.3	2.3	344	6.7	2.6	179	5.8	2.1	206	5.7	1.7	53
Native Meat	6.9	2.2	342	7.7	2.7	149	7.4	2.4	40	8.1	2.6	31
Eggs	6.8	2.5	251	6.9	3.0	164	5.5	2.5	208	6.2	2.2	54
Fruits	4.1	2.4	370	3.4	1.9	197	2.2	1.1	238	2.8	2.0	57
Family Food	8.2	2.3	343	7.9	2.5	185	7.5	2.7	206	8.0	2.1	51

[1] N=number of children who received that particular item.
Other group not included due to too few cases.

It can be seen that, with few exceptions, the White infant was generally introduced to solid foods earlier than the child of any other ethnic group. Children of Mixed parentage were a close second, then Indians, and finally Inuit. In most cases, however, the differences were not great.

The pattern of introduction and the type of food given in infancy was of some interest. In all cases pablum was the first solid food offered and fruits were second. Most children eventually received biscuits, canned meat, vegetables and bread; however, fish was given mainly to Inuit and Indian children. The Inuit children more commonly received Native meats whereas few White children received them. Eggs were commonly given to all children except the Inuit. The average time of introduction of family foods to the majority of the infants, was at about eight months.

VITAMIN SUPPLEMENTS

Table 7-25 presents data relating to the use of vitamin supplements by the children as recorded in this study.

Table 7-25
VITAMIN SUPPLEMENT USAGE

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
No	11	2.7	40	20.1	19	7.9	5	8.6	2	10.5	77	8.3
Yes	397	97.3	159	79.8	222	92.1	53	91.4	17	89.5	848	91.7
Daily	247	60.5	75	37.7	192	79.7	41	70.7	11	57.9	560	60.5
Irregular	150	36.7	84	42.2	30	12.4	12	20.7	6	31.6	282	30.5
Total	408		199		241		58		19		925	
No Data	25		47		27		7		7		113	

Overall, 91.7 percent of infants took vitamin supplements some of the time. For about 60 percent the supplements were daily and a 30.47 percent received them on an irregular basis. Inter-ethnic comparisons show that 97.3 percent of Inuit children and 91 percent of White, Mixed, and Other children were given vitamins, contrasted with 80 percent of Indian infants. Even though vitamin supplements were used, it was not on a total daily basis in any group, and with the Indian and Inuit, irregular use was quite common.

IRON SUPPLEMENTS

Data relating to the use of iron supplements are presented in Tables 7-26 and 7-27.

Table 7-26
IRON SUPPLEMENT USAGE

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
No	25	6.3	59	31.8	130	62.5	18	35.3	5	27.8	237	27.7
Yes	369	93.6	126	68.1	78	37.5	33	64.7	13	72.2	619	72.3
Daily	207	52.5	52	28.1	65	31.3	25	49.0	12	66.7	361	42.2
Irregular	162	41.1	74	40.0	13	6.2	8	15.7	1	5.6	258	30.1
Total	394		185		208		51		18		856	
No Data	39		61		60		14		8		182	

Overall, 72 percent of children received iron supplementation with its use between ethnic groups varying considerably; 93.6 percent of Inuit infants received iron compared with 37.5 percent of White infants. Table 7-27 shows that iron supplements were usually started between 3.8 and 5.2 months and, for 20 - 46 percent of those who started, it ceased between seven and nine months of age.

Table 7-27
AGE OF USE OF IRON, WHERE KNOWN

	Iron Started	Iron Stopped	Percent Stopped
INUIT			
Mean Age	3.8	8.3	19.7
S.D.	2.9	3.5	
N.	233	46	
INDIAN			
Mean Age	4.3	8.9	25.6
S.D.	3.0	3.4	
N.	86	22	
WHITE			
Mean Age	4.8	7.9	43.1
S.D.	3.3	3.0	
N.	51	22	
MIXED			
Mean Age	4.0	7.4	45.8
S.D.	3.1	3.7	
N.	24	11	
OTHER			
Mean Age	5.2	9.0	30.0
S.D.	2.8	3.6	
N.	10	3	

SWEET CONSUMPTION

Sweets are those foodstuffs commonly containing excessive amounts of sugar and whose main purpose is the provision of gustatory pleasure rather than nutritional benefit. Included are candies, chocolate bars and pop, which play no beneficial role in the normal optimum nutrition of the infant.

For many years it had been the concern of medical personnel working in the North that sweet consumption was excessive among Inuit and Indian infants and children. Table 7-28 gives data concerning the furnishing of sweets to infants in this study.

Table 7-28
FREQUENCY OF SWEET CONSUMPTION IN THE FIRST YEAR OF LIFE

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Sweets Consumed												
Yes	133	35.4	61	31.4	72	31.2	22	38.6	6	31.6	294	33.6
No	242	64.5	133	68.6	159	68.8	35	61.4	13	68.4	582	66.4
Total	375		194		231		57		19		876	
No Data	58		52		37		8		7		162	
Times Per Week Sweets Given to Child												
Mean		2.6		2.8		2.2		2.5			3.2	
S.D.		2.0		2.2		1.8		2.1			2.4	
Age of Introduction of Sweets (Months)												
Mean		8.9		8.5		8.6		8.9			8.2	
S.D.		2.4		2.8		2.7		2.6			3.4	

Approximately 66 percent of the infants received no sweets. Of the remainder, the average age of introduction was 8.6 months and the sweets were supplied about 2.5 times a week. The differences between the ethnic groups were not significant and not suggestive of excessive sweet consumption by one group over another. It is to be deplored, however, that such a large percentage of infants was given sweets in this early stage of life.

DISCUSSION

The conspicuous findings noted in the foregoing are:

1. Breastfeeding is on the decline, more so among the Indian than the Inuit but both native groups are affected. The factors associated with the decline in breastfeeding are:

a. The use of store bought food as the main family food source.

b. Maternal age - the younger the mother the more likely she is not to breastfeed.

c. Low birth weight of the infant.

d. Alcohol consumption by the mother.

e. Population of mother's place of residence - the higher the population the less likely is the mother to breastfeed.

f. Employment of the mother outside the home.

g. Smoking by the mother.

The decline observed is distressing. Breast milk is the ideal food for the young infant - especially so in a transitional society where "newer" modes of infant feeding have yet to become totally integrated into the society. Breast milk has certain characteristics ideal for the nutrition of the infant. With the possible exception of Vitamin D, human milk provides all necessary nutrients for normal infant growth over the first 4 to 6 months of life. It is pre-warmed, sterile, and the mode of feeding encourages close mother-child contact. Immunoglobins present in the colostrum and in breast milk enhance the defense mechanisms of the infant, especially against gastrointestinal and respiratory disease.

2. Breastfeeding was fairly common for White infants especially from mothers aged 20 - 30 years. This was somewhat unexpected since bottlefeeding was the more common method in the general Southern population. However, the northern White population was not representative of the general Canadian White population, being better educated, economically superior, and probably a more "nutritionally aware" group, with the mothers more inclined to breastfeed their infants than would those of the general population.

3. Solid, or supplementary, foods were being introduced at a very early age in all ethnic groups. This is of some concern. Epidemiologic studies (Eid,1970; Asher,1966; Heald and Hollander,1965) done in more affluent areas of the world show a positive correlation of early introduction of solid foods with excessive weight gain in infancy and possible childhood obesity. There is no nutritional requirement for introducing solid foods to the normal infant before four months of age, and the practice of earlier introduction of solid foods should be discouraged.

4. Vitamins were given to the vast majority of infants. This is desirable and should be continued. Most infants in the Territories were either breastfed or received evaporated milk. At the time of the study both were milks which required supplementation with Vitamins A, C, or D, to ensure adequate nutrition. A potential group at risk were the Indian infants, 20 percent of whom received no vitamins and only 38 percent received vitamins on a daily basis. It is of interest to note that virtually all of the Inuit infants received vitamins at least some of the time.

5. In contrast to vitamins, iron supplementation was not common in this population. The Inuit infants were the exception in that virtually all received iron. The significance of this

variation is not clear. In infancy, vitamins are more commonly used as a prophylactic routine rather than as a therapeutic regimen. Their use may reflect either a measure of concern on the part of the parents or effective public health education and communication by the nurse and community health worker. Iron, on the other hand, is commonly used therapeutically as well as prophylactically and its use in the infants of this study may reflect the presence or assumption of the presence of illness, notably anemia, as well as its use as a preventive medicine. It may also reflect the tendency of the Inuit, living in small settlements, to be over treated by the local nurse.

6. One third of infants of all ethnic groups were given sweets or candies on a more or less regular basis. There is no nutritional basis for this practice, and, in all liklihood, it is a major factor in the existence of caries, so prevalent in the teeth of the Northern child.

Most of the above considerations can be related to the change in living habits from the more traditional aspects of Northern lifestyle to those of the Southern Canadian "modern" way of life. This change has been occurring over the past 50 years and will probably continue until the "northern" way of life is, apart from a few extreme situations, not that much different from that of the rest of Canada.

A phenomenon often overlooked by the proponents of the "modern" way of life is that the patterns of living, introduced into an existing culture by a more dominant one, are not necessarily good or desirable. With the case in point, the South has introduced "modern" methods of infant feeding and in doing so has displaced a far superior mode of infant nutrition.

Artificial feeding as practiced by the vast majority of the Western world, is on the surface, simple, safe, and nutritionally sound. Closer examination shows it is not necessarily simple, and safe only under appropriate conditions for preparation and use. Its satisfactory use in our culture is contingent upon certain ingrained cultural attitudes regarding sterility, cleanliness, the reading and following of instructions, and certain environmental essentials such as potable water and refigeration being readily available, as well as the economic ability to purchase the necessary materials. These attributes cannot be conferred on alien cultures overnight, they require time, generations of time, education, and re-education.

Artificial feeding is bound to continue, it is thus necessary to provide guidelines for the preparation of safe, and nutritious infant formulas. These guidelines should apply to the Northern citizen and be understood by all concerned. Guidelines and detailed background information regarding infant nutrition should also be available for use by medical personnel who counsel their peers, and their patients.

FAMILY EATING PATTERNS

The questionnaire also obtained information describing the type of food consumed by the family. Estimates of the nutritional quality or adequacy of the diet or the amount of income devoted to food were not included.

Table 7-29
MAIN FAMILY FOOD SOURCE

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Mainly Store	87	21.0	86	41.0	233	95.5	40	67.8	14	74.0	460	49.0
Half Store, Half Native	252	62.0	119	57.0	10	4.1	18	30.5	4	21.0	403	42.9
Mainly Native	70	17.0	3	1.4	1	0.4	1	1.7	1	5.0	76	8.1
Total	409		208		244		59		19		939	
No Data	24		38		24		6		7		59	

Chi-Square=413.81 p<0.001

Table 7-30
CONSUMPTION OF NATIVE FOODS COMPARED BY
POPULATION SIZE OF MOTHER'S PLACE OF RESIDENCE

	Mainly Store		Half Store, Half Native		Mainly Native		Total
	N	%	N	%	N	%	
<500							
Inuit	18	11.8	105	68.6	30	19.6	153
Indian	13	21.0	48	77.4	1	1.6	62
White	8	100.	-------		------		8
500-1000							
Inuit	51	26.4	108	56.0	34	17.6	193
Indian	17	44.7	19	50.0	2	5.3	38
White	19	82.6	3	13.0	1	4.3	23
>1000							
Inuit	18	28.6	39	61.0	6	9.5	63
Indian	56	52.3	51	47.7	------		107
White	206	96.7	7	3.3	------		213
Total	406	47.20	380	44.18	74	8.60	860

No Data = 178

As can be seen from the data of Table 7-29, the majority of families of White infants utilized store bought provisions. This was in sharp contrast to the other ethnic groups in the Territories, especially the Inuit and Indian families where native food constituted a large proportion of the family diet. Native foods refer to those obtained from local resources and comprised mainly fish, and land and sea mammals. Only a small proportion of families (8.1%) depended mainly on native foods, and, of this group, the Inuit made up 92.1 percent.

Native foods were consumed more commonly in the smaller settlements as, to a large extent it was the Native who lived in these smaller settlements. When the ethnicity of the child was the criterion, the effect of population size disappeared for the White, Mixed, and Unclassificable populations, but persisted in the Inuit and Indian groups. At all levels of population, more Inuit families persisted in eating their native foods (Table 7-30).

For individuals eating native foods, the duration of availability of these foods was of importance. Table 7-31 shows that, for those families that consumed "native food" at least one half of the time, native food was available year round in 90.1 percent of cases.

Table 7-31
AVAILABILITY OF NATIVE FOOD FOR THOSE WHO EAT NATIVE FOOD AT LEAST ONE HALF OF THE TIME

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Year Round	270	87.1	119	97.5	3	100.0	17	89.5	3	100.0	420	90.1
Winter Only	9	2.9	2	1.6	0	-	1	5.3	-	-	13	2.8
Summer-Fall	31	10.0	1	0.8	0	-	1	5.3	-	-	33	7.1
Total	310		122		8		19		3		466	
No Data	12		0		3		0		2			

Contingency table analysis comparing "family food source" with "availability of native food", with the ethnicity of the child held constant, shows that with the exception of the Inuit, there was no relationship between these two variables. In the case of the Inuit, mainly native food was used year round when it was available. Where native food was available only periodically, it was store bought food which was used. Table 7-32 summarizes these findings.

Table 7-32
INUIT - AVAILABILITY OF NATIVE FOOD
COMPARED BY FAMILY FOOD SOURCE

	YEAR ROUND		PERIODICALLY		TOTAL	
	N	%	N	%	N	%
Mainly Store	8	2.9	6	14.3	14	4.5
Half Store Half Native	200	73.5	32	76.2	232	73.9
Mainly Native	64	23.5	4	9.5	68	21.7
Total	272		42		314	
No Data = 119						

Data was obtained regarding the patterns of consumption of fish, caribou, and sea mammals, and is summarized in Tables 7-33, 7-34 and 7-35.

Table 7-33

FISH CONSUMPTION COMPARED BY EATERS OF NATIVE FOODS

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Not at All	5	1.7	4	3.3	-	-	-	-	-	-	9	2.0
Infrequently	132	42.7	21	17.2	4	40.0	9	47.4	1	20.0	167	35.8
Often	172	55.6	97	79.5	6	60.0	10	52.6	4	80.0	291	62.2
Total	309		122		10		19		5		467	
No Data	13		0		1							

Table 7-34

CARIBOU CONSUMPTION COMPARED BY EATERS OF NATIVE FOODS

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Not at All	6	2.0	2	1.7	1	10.0	1	5.0	-	-	10	2.2
Infrequently	52	16.7	28	23.7	6	60.0	1	5.0	3	60.0	90	19.3
Often	255	81.3	88	74.6	3	30.0	18	95.0	2	40.0	366	78.5
Total	313		118		10		20		5		466	
No Data	9		4		1		0		0		14	

Table 7-35

SEA MAMMAL CONSUMPTION COMPARED BY EATERS OF NATIVE FOODS

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Not at All	39	13.1	99	95.2	8	80.0	7	46.7	-	-	153	36.0
Infrequently	149	50.0	4	3.8	2	20.0	6	40.0	1	100	162	37.8
Often	110	36.9	1	1.0	-	-	2	13.3	-	-	113	26.4
Total	298		104		10		15		1		428	
No Data	24		18		1		4		4		51	

These tables consider only those families where a native food source was used at least one half of the time. In these tables, the numbers for the White, Mixed, and Other groups were too small for consideration, so no comment will be made. In the Inuit and Indian groups, there were minor differences in the frequency of consumption of caribou but, in the case of fish, the Indian appeared to eat it more often than did the Inuit. Naturally very few Indians ate sea mammals at all and we note with astonishment and regret that only about one third of the Inuit persisted in frequent consumption of sea mammals, a food which, for this predominantly coastal people, was traditionally the most consistent food staple and was certainly the most valuable, but underutilized and wasted, food resource in the Canadian North.

Information was obtained regarding the utilization of meat or fish, and the consumption of fresh fruits and vegetables for all groups, and it is presented in Tables 7-36 and 7-37.

Table 7-36
CONSUMPTION OF MEAT OR FISH

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Daily	237	58.0	140	67.3	224	92.9	48	80.0	16	84.3	665	71.0
>2 Times/Wk	136	33.5	53	25.5	17	7.1	8	13.3	2	10.5	216	23.1
<2 Times/Wk	35	8.5	15	7.2	--	--	4	6.7	1	5.2	55	5.9
Total	408		208		241		60		19		936	
No Data	25		38		27		5		7		102	
Percent Daily or >2 Times/Wk	91.5		92.8		100.0		93.3		94.7		94.1	

No Data = 102

Table 7-37
CONSUMPTION OF VEGETABLES AND FRUIT

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
None	1	0.2	-	-	1	0.4	1	1.7	-	-	3	0.3
Infrequent	320	78.4	68	32.7	9	3.7	7	11.9	1	5.3	405	43.2
Often	58	14.2	83	39.9	185	75.8	43	72.9	17	89.5	386	41.2
Summer Only	13	3.2	3	1.4	-	-	-	-	-	-	16	1.7
Winter Only	16	3.9	54	26.0	49	20.1	8	13.6	1	5.3	128	13.7
Total	408		208		244		59		19		938	
No Data	25		38		24		6		7		100	

With the exception of the families of White infants, the differences between the other groups of meat and fish consumption were not particularly marked as these groups appeared to consume meat with reasonable frequency.

The patterns of acceptance of fruits and vegetables were different in that while White families ate these foods frequently, the two major Native groups did not appear to use these foods as often as may be desirable. The variation among ethnic groups regarding the consumption of fresh fruits and vegetables is of some concern as these supply a major source of nutrients in the usual Canadian diet.

Table 7-38 shows that almost 58.1 percent of families of this study used vegetables and fruits on an "infrequent" basis.

Table 7-38
FRUIT AND VEGETABLE CONSUMPTION COMPARED BY FAMILY FOOD SOURCE

	Mainly Store		Half Store, Half Native		Mainly Native		Total	
	N	%	N	%	N	%	N	%
Infrequently	194	39.4	321	76.2	60	78.9	575	58.1
Often	299	60.6	100	23.8	16	21.1	415	41.9
Total	493		421		76		990	

No Data = 48
Chi-Square=141.7 p<0.001

"Infrequent" fruit and vegetable consumption was twice as common among those families with a "half native" or "mainly native" food source, when compared to families with a "mainly store" food source. This illustrated a pressing problem in the Territories. Vegetables and fruit are good sources of vitamins, proteins, and minerals, and are an important part of the usual Canadian diet. Very few families in the North had a diet so traditional that it provided the necessary nutrients for optimum nutrition; thus the need of fresh fruits and vegetables on a regular and frequent basis applied virtually to the entire Territories' population. The information presented in Table 7-38 shows that all segments of the population were at risk, but the segment in transition - the "half store, half native" group - were at greatest risk.

Towns with populations of less than 500 people had the least number of families eating fresh fruits and vegetables on a regular basis, however, as Table 7-39 shows, even towns of 2500 people contained a sizeable proportion of families who did not commonly eat fruits and vegetables.

Table 7-39
FRUIT AND VEGETABLE CONSUMPTION BY POPULATION OF RESIDENCE

	<500		500-1000		1000-2400		2500+		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Infrequently	209	84.9	206	76.6	82	39.3	79	29.6	576	58.1
Often	37	15.0	63	23.4	127	60.8	188	70.4	415	41.9
Total	246		269		209		267			

No Data = 47
Chi-Square = 230.4 p<0.001

FOOD SHORTAGES

An unfortunate fact of life in the Territories is that food shortages occasionally do occur. The questionnaire explored the degree to which food shortages were a problem and subdivided the variable into "never", "occasionally" (less than two days per month), and "often" (more than two days per month). Table 7-40 shows that such shortages occurred only to the families of the

Inuit and Indian children, with the Inuit families affected nearly twice as often as Indian families.

Table 7-40
FOOD SHORTAGES

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Never	313	76.7	183	88.0	241	100	59	100	19	100	815	87.2
Occasionally	76	18.6	22	10.6	-	-	-	-	-	-	98	10.5
Often	19	4.7	3	1.4	-	-	-	-	-	-	22	2.4
Total	408		208		241		59		19		935	
No Data	25		38		27		6		7		103	

Considering the Indian and Inuit groups only, communities having between 250 and 1000 people were more likely to have families experiencing food shortages than were those of larger or smaller communities. Of the families living in communities of 250 - 1000 people, nearly 25 percent had periods of food shortages (Table 7-41). Nearly 5.3 percent of these families were short of food more than two days per month (Data not shown in tables).

Table 7-41
FAMILY FOOD SHORTAGE COMPARED BY POPULATION OF RESIDENCE

	<250		250-1000		1001-2499		2500+		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Never	41	93.2	285	75.4	87	86.1	61	95.3	474	80.7
Sometimes	3	6.8	93	24.6	14	13.9	3	4.7	113	19.3
Total	44		378		101		64		587	

No Data = 92
Chi-Square = 21.96 $p<0.001$

Factors strongly associated with periods of family food shortages were:

Maternal education (Table 7-42)

In families having mothers with no education 27 percent had bouts of family food shortages as compared to 18.9 percent of mothers with one to nine years of education, and 12.8 percent of mothers with over ten years of education. Most of these differences are accounted for by the ethnicity of the mother, size of community and employment of the father.

Table 7-42
FAMILY FOOD SHORTAGE COMPARED BY MOTHER'S EDUCATION

	No Education		1-9 Years		10+ Years		Total	
	N	%	N	%	N	%	N	%
Never	100	73.0	245	81.1	130	87.2	475	80.8
Occasionally	37	27.0	57	18.9	19	12.8	113	19.2
Total	137		302		149		588	

No Data = 91
Chi-Square = 9.3 $p<0.01$

Father's employment (Table 7-43)

In families with fathers having intermittent employment 31 percent had food shortages, as compared to 17 percent of families with fathers with no recent employment, and 10 percent of families with steadily employed fathers. The unusual observation of less food shortages in families of fathers with no employment compared to the intermittently employed is probably due to the "unemployed" father's opportunity to more readily hunt and trap for his family. It also fits the above observations of less food shortage in settlements of less than 250 people.

Table 7-43
FAMILY FOOD SHORTAGE COMPARED BY FATHER'S EMPLOYMENT

	None		Occasionally		Steady		Total	
	N	%	N	%	N	%	N	%
Never	48	82.8	135	68.9	217	89.7	400	80.6
Occasionally	10	17.2	61	31.1	25	10.3	96	19.4
Total	58		196		242		496	

No Data = 183
Chi-Square = 30.2 $p<0.001$

Welfare (Table 7-44)

Among families on welfare 29 percent had food shortages compared to 10 percent of families not on welfare.

Table 7-44
FAMILY FOOD SHORTAGE COMPARED BY FAMILY ON WELFARE

	Welfare		No Welfare		Total	
	N	%	N	%	N	%
Never	146	70.5	215	89.2	361	80.6
Occasionally	61	29.5	26	10.8	87	19.4
Total	207		241		448	

No Data = 231
Chi-Square = 23.7 $p<0.001$

Family income (Table 7-45)

Nearly 28 percent of families with an income of less than \$2000.00 had bouts of food shortages compared to about 15 percent for families with incomes between \$6000.00 and \$10000.00 and 6 percent for families with incomes greater than \$10000.00.

Table 7-45
FAMILY FOOD SHORTAGE COMPARED BY FAMILY INCOME

	<\$2000		\$2001-6000		\$6001-10000		\$10000+		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Never	109	72.2	98	79.0	86	95.1	52	92.9	345	79.9
Occasionally	47	27.8	26	21.0	15	14.9	4	6.1	87	20.1
Total	151		124		101		56		432	

No Data = 247
Chi-Square = 13.2 p<0.01

Alcohol consumption by the mother (Table 7-46)

Nearly 18 percent of families of mothers who never drank had periods of food shortages, compared with 10.9 percent of mothers who drank but did not become intoxicated, and 27.6 percent of families with mothers who drank to the point of intoxication. This may be explained by the fact that non-drinkers were more likely to live in small settlements where food shortages were more probable and liquor not as readily available. Findings for the father were not as clear cut as that of the mother (Table 7-47).

Table 7-46
FAMILY FOOD SHORTAGE COMPARED BY ALCOHOL CONSUMPTION OF MOTHER

	Non-Drinker		Never Intox.		Intoxicated		Total	
	N	%	N	%	N	%	N	%
Never	212	82.2	98	89.1	118	72.4	428	80.6
Occasionally	46	17.8	12	10.9	45	27.6	103	19.4
Total	258		110		263		531	

No Data = 148
Chi-Square = 12.5 p<0.001

Table 7-47
FAMILY FOOD SHORTAGE COMPARED BY ALCOHOL CONSUMPTION OF FATHER

	Non-Drinker		Never Intox.		Intoxicated		Total	
	N	%	N	%	N	%	N	%
Never	104	77.0	97	87.4	178	78.8	379	80.3
Occasionally	31	23.0	14	12.6	48	21.2	93	19.7
Total	135		111		226		472	

No Date = 207
Chi-Square = 4.8 0.05<p<0.10

State of crowdedness in home (Table 7-48)

In families where crowding was less than average 13.3 percent had food shortages compared to 29.7 percent of families which lived in crowded conditions.

Table 7-48
FAMILY FOOD SHORTAGE COMPARED BY CROWDEDNESS IN HOME

	Minimal		Average		Poor		Total	
	N	%	N	%	N	%	N	%
Never	91	86.7	285	81.0	64	70.3	440	80.3
Occasionally	14	13.3	67	9.0	27	29.7	108	19.7
Total	105		352		91		548	

No Data = 131
Chi-Square = 8.5 $p<0.01$

Signs of stress (Table 7-49)

Nearly 22 percent of families showing signs of stress had periods of food shortages compared to about 7 percent of families where no stress was apparent.

Table 7-49
FAMILY FOOD SHORTAGE COMPARED BY SIGNS OF FAMILY STRESS

	No Stress		Stress		Total	
	N	%	N	%	N	%
Never	309	82.8	101	77.7	410	81.5
Occasionally	64	17.2	29	22.3	93	18.5
Total	373		130		503	

No Data = 176
Chi-Square = 1.37 $p>0.05$

General level of care of the child (Table 7-50)

Among families where the care of the child was poor 42.2 percent had periods of food shortages compared to 16.5 percent of families where the care of the child was above average.

Table 7-50
FAMILY FOOD SHORTAGE COMPARED BY GENERAL LEVEL OF CARE OF CHILD

	Above Average		Average		Poor		Total	
	N	%	N	%	N	%	N	%
Never	91	83.5	321	82.1	26	57.8	438	80.4
Occasionally	18	16.5	70	7.9	19	42.2	107	19.6
Total	109		391		45		545	

No Data = 152
Chi-Square = 15.9 $p<0.001$

The above factors are associated with family food shortages and, while not necessarily the actual causes in most cases, they do document the environment surrounding food shortages. To a large extent, it is the environment of poverty, excessive alcohol consumption and poor child care.

No easy recommendations to alleviate the problems of food shortages in families can be made; however, frequent shortages of food within a family increases the probability of malnutrition among the members of that family, and such families should be regarded as at high risk in the probable development of malnutrition and ill health in general.

INFANT NUTRITION PRACTICES AND MORBIDITY

BREAST MILK AND MORBIDITY

Many who have written on this subject have expressed the opinion that the breastfed infant is less likely to become ill than one who is bottlefed. To a large extent epidemiological data have supported such beliefs. Grulee in 1935 showed that the bottlefed infant had a significantly greater probability of death than the breastfed infant, as well as higher incidence rates of respiratory and gastrointestinal disease. Plank and Milanesi (1973) in Chile have demonstrated that the breastfed infant has a lower mortality rate than the bottlefed infant. Maynard and Hammes (1970) in a study of growth, morbidity and mortality among the Inuit of Alaska concluded that infants receiving milk from the bottle experienced more illness than those receiving breast milk. French (1967) revealed that bottlefed Navajo infants had a higher incidence of illness, particularly diarrhoea, than breastfed infants. Among Canadian Natives in 1962, Graham-Cumming (1967) demonstrated a reduced mortality in the breastfed infant and concluded that "In the Indian situation, bottlefeeding is a hazard to infant life and, though careful supervision was effective to quite a marked degree in countering the danger, it was much less effective than simple breastfeeding for six months." With these research findings in mind an effort was made to determine the health consequences of breast and bottlefeeding from the data of this study.

The general procedure was the comparison of the average number of illness episodes of an infant who was breastfed for at least three months with the same variable for an infant who was bottlefed from birth. In those cases where an infant was both bottle and breastfed, he would be considered as part of both categories. The three major ethnic groups were similarily examined. The variables employed were the total number of:

a. days away from home due to illness;

b. morbidity contacts;

c. episodes of diarrhoea;

d. episodes of otitis media;

e. upper respiratory tract infections;

f. episodes of pneumonia;

g. episodes of chronic bronchitis.

Table 7-51 summarizes the information obtained.

One most striking finding was that in all ethnic groups the breastfed infant was away from home due to illness for a shorter time period than was the bottlefed infant. As an example, in the first year of life the breastfed Inuit infant was away from home for an average of 4.25 days compared to 16.60 days for the bottlefed infant, yet both had virtually the same number of morbidity contacts. The direction of the effect - whether breastfeeding influenced the number of days away, or whether the number of days away influenced the practice of breastfeeding - is not clear from this one statistic; likely both factors play a role.

Further perusal of the table shows that the practice of breastfeeding is associated with a lesser degree of morbidity compared with bottlefeeding in nearly every variable. These figures suggest that breastfeeding is of definite benefit to the young child, a finding in general agreement with other workers.

It has been said that the breastfed infant is protected from infectious diarrhoea, presumably because of the inherent nutritional, hygienic, and immunological attributes of breast milk. It was surprising, therefore, to note in our data the lack of significant benefit of breastfeeding in preventing diarrhoea. This may be attributed to: a) the total number of episodes of infectious diarrhoea was small, especially when subdivided by ethnic group: and b) the nature and degree of severity of the diarrhoea reported was not specified.

It has been shown that otitis media is more common among bottlefed infants - especially Inuit infants (Schaefer 1971). Among the Indian and White infants, the average number of episodes of otitis media was indeed significantly greater among infants bottlefed from birth than in breastfed infants, but not among the Inuit.

Table 7-51
INCIDENCE OF MORBIDITY COMPARED TO NATURE OF INFANT FEEDING

Variable	Breast Fed			Bottle Fed			
	3 or More Months			From Birth			
	Mean	S.D.	N	Mean	S.D.	N	
DAYS AWAY DUE TO ILLNESS							
Inuit	4.96	12.04	159	17.78	23.7	245	***
Indian	4.93	8.92	31	17.09	24.02	169	***
White	0.44	1.35	52	2.56	6.68	188	***
TOTAL MORBIDITY CONTACTS							
Inuit	20.57	11.78	159	20.92	12.8	245	
Indian	11.13	5.59	31	13.87	8.62	169	*
White	5.87	3.27	52	7.28	4.23	188	*
DIARRHOEA							
Inuit	1.08	1.32	159	0.96	1.26	245	
Indian	0.45	0.77	31	0.80	1.11	169	*
White	0.29	0.61	52	0.41	0.81	188	
OTITIS MEDIA							
Inuit	2.37	3.07	159	2.40	2.86	245	
Indian	0.61	0.88	31	1.33	2.06	169	**
White	0.15	0.50	52	0.24	0.63	188	
UPPER RESPIRATORY TRACT INFECTION							
Inuit	4.72	3.39	159	4.33	3.42	245	
Indian	2.19	1.87	31	2.92	3.04	169	
White	0.77	0.83	52	0.99	1.15	188	
CHRONIC BRONCHITIS							
Inuit	0.20	0.62	159	0.53	1.08	245	***
Indian	0.35	0.55	31	0.62	0.97	169	*
White	0.15	0.42	52	0.29	0.67	188	
PNEUMONIA							
Inuit	0.82	1.32	159	1.54	2.01	245	***
Indian	0.61	1.05	31	1.21	1.84	169	*
White	0.02	0.14	52	0.09	0.31	188	*
HEALTH[1]							
Inuit	93.17	10.23	158	89.61	14.91	244	**
Indian	95.04	11.10	31	93.03	11.16	166	
White	98.88	0.95	52	97.79	7.25	187	*
MEAN SEVERITY OF ILLNESS[1]							
Inuit	1.87	0.56	158	2.32	1.02	244	***
Indian	1.80	0.81	31	2.16	1.04	166	
White	1.32	0.50	52	1.60	0.91	187	**

Difference between means statistically significant:
*** $p<0.001$; ** $p<0.01$; * $p<0.05$ (Student t).

[1] See section--Infant Health Indicators in Chapter 8.

Confirmation of our impressions with regard to otitis media and mode of infant nutrition in the White and Indian rather than Inuit groups appears puzzling. Larger numbers (compared with Indians) and higher known morbidity (compared with Whites) appeared to favour the Inuit as the best test group. However, it should be noted that among Whites and Indians morbidity recordings were based commonly on diagnoses made by doctors, whereas with Inuit, due to their dispersal over a wide and more remote area, the diagnosis was tentative and made by nurses. We must further stress here that recording of "Otitis Episodes" did not differentiate between milder degrees such as otoralgia or myringitis accompanying "colds" and more severe forms of otitis media exemplified by eardrum perforation and discharge.

Similarly it was found that upper respiratory tract infections were equally common among breast and bottlefed infants, yet there were significantly higher rates of more serious and chronic respiratory diseases such as chronic bronchitis and pneumonia demonstrated among bottlefed infants. A possible explanation is that while the breastfed infant is subject to, and suffers from, the same infection pressure as the bottlefed infant, the breast milk has enhanced his defense mechanisms and he does not suffer as much from the complications of acute infection. The observed difference may reflect also to some degree the possible effects of cow milk as an allergen with the lung as the target organ (Upadhyay and Gerrard, 1969).

IRON, VITAMINS AND ILLNESS

A procedure similar to the one outlined in the previous section was employed to determine if the use of iron or vitamin supplements had any bearing on the frequency of illness. The hypothesis was that there would be either: a) no difference between the use or non-use of these compounds and illness; or b) an inverse relationship between the two variables - that is, higher use of iron or vitamins would be associated with a decreased frequency of illness. Because virtually all children received vitamin supplements it was impossible to analyze confidently the data regarding the use of vitamin supplements and morbidity; however, iron is a different story. Table 7-52 summarizes the relationship of iron usage and morbidity and presents the unexpected observation that, for the most part, the use of iron is associated with an increased incidence of morbidity. There are few parallel studies with which to compare this finding. Graham-Cumming (1966) noted that the overall mortality rate of Canadian Native infants receiving vitamins for more than three months was 43/1000 as compared with 158 amongst those not reported to have been given vitamins. Regarding iron he noted that infants receiving iron drops had a significantly lower mortality rate (37/1000) than did those not receiving iron (111/1000).

Table 7-52

INCIDENCE OF MORBIDITY COMPARED TO USE OF IRON SUPPLEMENTS

Group	INUIT			INDIAN			WHITE		
Variable	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N
DAYS AWAY DUE TO ILLNESS									
Iron Not Taken	5.29	8.86	21	6.66	11.12	56	0.92	3.04	130
Iron Taken	13.23	21.43	357[3]	19.19	26.04	123[3]	3.99	7.99	78[2]
TOTAL MORBIDITY CONTACTS									
Iron Not Taken	12.38	6.69	21	9.84	6.06	56	6.55	3.75	130
Iron Taken	21.79	12.55	357[3]	15.52	9.04	124[3]	7.49	4.34	78
DIARRHOEA - EPISODES									
Iron Not Taken	0.90	1.58	21	0.48	0.74	56	0.28	0.59	130
Iron Taken	1.02	1.22	357	0.91	1.24	124[2]	0.59	1.01	78[1]
OTITIS MEDIA - EPISODES									
Iron Not Taken	1.09	1.73	21	0.61	0.93	56	0.18	0.64	130
Iron Taken	2.55	3.01	357[1]	1.61	2.25	124[3]	0.24	0.51	78
UPPER RESPIRATORY TRACT INFECTION - EPISODES									
Iron Not Taken	3.14	3.51	21	1.77	1.98	56	0.95	1.18	130
Iron Taken	4.69	3.46	357[1]	3.35	3.07	124[3]	0.90	1.01	78
PNEUMONIA - EPISODES									
Iron Not Taken	1.33	1.71	21	0.64	1.21	56	0.03	0.17	130
Iron Taken	1.25	1.81	357	1.51	2.28	124[3]	0.13	0.37	78[1]
CHRONIC BRONCHITIS - EPISODES									
Iron Not Taken	0.24	0.54	21	0.36	0.64	56	0.22	0.53	130
Iron Taken	0.42	0.98	357[2]	0.72	1.07	124[2]	0.27	0.69	78
ANEMIA - TOTAL CONTACTS									
Iron Not Taken	.09	0.44	21	---	---	---	.02	0.15	130
Iron Taken	0.55	0.93	357	---	---	---	0.10	0.31	78[1]
HEALTH SCORE[4]									
Iron Not Taken	95.96	3.43	21	97.27	2.60	55	98.70	1.46	130
Iron Taken	93.35	4.77	356[1]	93.85	4.69	122[3]	98.07	1.67	78[2]
MEAN SEVERITY OF ILLNESS[4]									
Iron Not Taken	1.82	0.68	21	1.88	0.90	55	1.35	0.64	130
Iron Taken	2.03	0.59	356	2.06	0.71	122	1.75	0.73	78[3]
WELL BABY CARE CONTACTS									
Iron Not Taken	6.76	3.85	21	3.69	2.82	56	5.92	2.78	130
Iron Taken	9.36	4.36	357[2]	4.48	3.62	124	6.29	2.41	78

Difference between means statistically significant:

[1] $p<0.05$; [2] $p<0.01$; [3] $p<0.001$ (Student t).

[4] See Section--Infant Health Indicators in Chapter 8.

Increased morbidity, particularly in regard to severe diarrhoea, was observed in Baffin Zone infants during a period 1972-1975 when oral iron medication was started routinely very early in infancy. This diarrhoea ceased to be a significant problem when the routine use of iron was stopped (Schaefer, 1975). An editorial in Lancet (1974) refers to the dilemma facing physicians trying to combat iron deficiency anemia in populations with high infection pressure, because of the observed flare-up of existing infection after iron medication or greater susceptibility to new infections, especially gastrointestinal infections, in infancy. Although bottlefed infants are commonly at greater risk to infection than breastfed infants, the greater resistance of breastfed infants against E. coli and various gut pathogens can be abolished by using supplementary iron in amounts to neutralize excess iron binding capacity of lactoferrin (Bullen et al, 1972). Although not demonstrated in Table 7-52, the data show that there was no difference in the frequency or duration of breastfeeding between the groups receiving iron and not receiving iron.

Due to the obvious public health importance of such an observation, an attempt was made to determine if the population receiving iron was unique in some manner - the most likely manner being in terms of health care utilization or in duration of breastfeeding, the breastfed infant presumably having less illness. Use of iron supplements compared to health care utilization was assessed by examining the frequency of prenatal visits and Well Baby Care contacts. Two of the three variables mentioned, i.e. prenatal visits, and duration of breastfeeding showed no relationship to use of iron supplements and are not documented in Table 7-52. The other variable, Well Baby Care visits showed, among Inuit, that iron usage was directly related to number of WBC visits; however, no such relationship exists for the Indian or White groups.

Thus the question which begs an answer, but which this study cannot adequately provide, is whether the use of iron leads somehow to increased morbidity, or, whether increased morbidity, and hence medical contact, leads to increased use of this supplement. For the White child the latter hypothesis may be correct; however, since 95 percent of Inuit and 75 percent of Indian infants received iron, it would be difficult to explain the situation on this basis. This is very definitely an area for further research.

SUMMARY

This chapter's purpose has been to document the infant feeding practices among residents of the NWT during the years 1973 to 1975. A number of important observations have been made:

1. Breastfeeding was on the decline - more so among the Indian groups and especially among young Native mothers living in the larger towns of the NWT.

2. Solid foods were being introduced into the infant's diet earlier than was necessary. This may predispose the child to alterations in his growth pattern, eventually leading to obesity. In association with non-human milks, especially evaporated milk, the early use of solids may interfere with the normal water balance of the infant by placing an excessive renal solute load on the kidneys.

3. Candies were being fed to infants. This was an unwise practice and one which could subject the infant to the early onset of dental caries. These sweets could have also displaced better nutrients, or oversupplied calories leading to obesity. It is claimed that sugar has a specific stimulating action on fat cell multiplications up to 18 months of age (Al-Nagdy et al, 1966; Brook et al, 1969).

4. Native foods still constituted an important source of food and were the main source of animal proteins for Native residents of the Territories. This practice should be encouraged..

5. Food shortages were still occurring within the Native groups. Gross malnutrition was not readily visible among the infants or families of the study, yet food shortages could have predisposed a family to sub-clinical malnutrition which may have lead to possible increased susceptibility to infection (Scrimshaw et al, 1968; McFarlane, 1976).

6. The morbidity patterns of the infant appeared to be influenced by his day-to-day nutrition patterns. The breastfed infant had fewer bouts of serious illness than did the bottlefed infant. These findings are similar to those found by other workers, and support the recommendation that breastfeeding be strongly encouraged as the best mode of infant nutrition. An interesting and potentially very important observation was made showing that the use of iron supplements was associated with greater frequencies of various illness. This may reflect the use of this supplement too early in the life of the infant. It certainly indicates a need for further research.

CHAPTER 8

HEALTH CARE AND ILLNESS PATTERNS IN THE NORTHWEST TERRITORIES

by D.W. Spady

INTRODUCTION

This chapter will present the data regarding the health of infants in the Northwest Territories from the eighth day of life to the end of the first year. It will first examine the adequacy of health care in terms of attendance at well baby care clinics, health care visits and immunization status. It will then present the statistics describing the morbidity occurring in this group of children.

In determining the population to be discussed, stillbirths and perinatal deaths were excluded. In addition, only those infants who had been living in the NWT for the complete first year of life were studied. The reason for this was that preliminary analysis had shown that only 74 percent of the White infants completed their first year of life in the Territories, the remainder had moved out. Comparison with this group would therefore tend to be biased. The composition of the group to be discussed uses the definition of ethnicity as described in the Chapter 3--The People--and is presented in Table 8-1.

Table 8-1
COMPOSITION OF INFANTS BY ETHNICITY AND ZONE OF RESIDENCE

	INUIT	INDIAN	WHITE	MIXED	OTHER	TOTAL
Baffin	200	--	16	12	--	228
Inuvik	45	74	39	15	9	182
Mackenzie	79	172	205	35	17	508
Keewatin	109	--	8	3	--	120
Total	433	246	268	65	26	1038

While the statistics for the Other group usually will be tabulated, due to the small sample size no conclusions or statistical relationships will be drawn from the presented data for this group, and they will not generally be considered in the discussion.

ADEQUACY OF HEALTH CARE

The parameters available to assess the adequacy of health care for the children of this study were:

a. Number of health care visits.

b. Immunization status.

HEALTH CARE VISITS

In this study, a "health care visit" referred to a visit by an infant to a medical professional for health purposes. It may be subdivided into:

a. Well baby visits - for the purpose of health maintenance.

b. Morbidity visits - for the purpose of diagnosis, treatment and follow up of illness.

Table 8-2 presents data describing the frequency of health care visits subdivided by ethnic group. Only one visit per day and no hospital days were counted. Very few infants had no health care visits. An important observation which can be drawn from the following data is that whatever the diseases that afflict them, the infants living in the NWT had ready access to primary health care facilities.

Table 8-2
HEALTH CARE VISITS

	INUIT(E)	INDIAN(I)	WHITE(W)	MIXED(M)	OTHER
Mean	28.8	16.0	12.7	14.2	12.5
Std. Dev.	14.7	9.4	4.9	7.5	9.0
No Visit	2	7	1	1	1
Total	433	246	268	65	26

Differences between means[1],[2] W<I,E; M<E; I<E p<0.05

[1] The significance of differences between means was calculated using oneway analysis of variance and Scheffe's procedure for contrasts.

[2] This statistic should be read as follows: The White group is significantly different from the Indian and Inuit Groups and the Mixed and Indian groups are significantly different from the Inuit group.

The Inuit had by far the greatest number of health care visits, almost twice that of any other group. The Indians, although having far fewer health care visits than the Inuit, still had a significantly greater number of visits than did the White children.

Table 8-3 describes health care visits subdivided by zone of mother's residence and ethnicity of child. In all regions except Inuvik, where Inuit and Indian groups had substantially the same frequency of visits, the Inuit had the largest number of health care visits, and the Whites had the least number of visits.

Table 8-3
HEALTH CARE VISITS BY ETHNICITY AND ZONE

	INUIT			INDIAN			WHITE			Mixed		
	Mean	S.D.	N.	Mean	S.D.	N.	Mean	S.D.	N.	Mean	S.D.	N.
Baffin	26.4	13.2	200	---	---	--	12.3	3.3	16	19.3	7.2	12
Inuvik	18.5	10.3	45	19.4	10.9	74	9.9	4.5	39	14.7	8.8	15
Mackenzie	33.4	15.9	78	14.5	8.2	172	13.0	4.9	205	11.4	4.6	35
Keewatin	34.1	13.9	109	---	---	--	18.0	4.8	8	23.7	13.9	3

Within each ethnic group, Keewatin consistently had the highest frequency of health care visits. This is possibly due to the fact that Keewatin consists mainly of small communities; hence the population probably had closer contacts with the public health nurse or community health worker. The Inuvik and Mackenzie zones are more heterogeneous in the sizes of their communities, but people generally lived in larger communities and consequently may have had less personal contact with health personnel and fewer health care visits.

A surprising feature of these tables is the large number of health care visits by the infants of the study. A review of individual records showed that some infants had as many as 90 visits in the year. For these infants this averaged out to one visit every four days. Table 8-4 shows that almost 43 percent of infants had 20 or more health care visits. Nearly 8.5 percent of infants had 40 or more visits (not shown in tables).

Table 8-4
NUMBER OF CHILDREN WITH OVER TWENTY HEALTH CARE VISITS, BY ETHNICITY AND ZONE

	BAFFIN		INUVIK		MACKENZIE		KEEWATIN		TOTAL	
	>20		>20		>20		>20		>20	
	N	%	N	%	N	%	N	%	N	%
Inuit	145	73	22	49	63	80	100	92	330	76
Indian	-----		28	38	48	28	-----		76	31
White	-----		1	3	21	10	2	25	24	9
Mixed	5	42	2	13	1	3	2	66	10	15
Other	-----		-----		4	23	-----		24	15
Total	150	63	53	29	137	27	104	87	444	43

Between the ethnic groups the variation is considerable with 76 percent of Inuit having more than 20 visits per year; this is an average of one visit every two and one-half weeks. Nineteen percent of Inuit had 40 or more visits in the year. This can be compared to the White infant, where none had over 40 visits and only 9 percent had over 20 visits.

A health care visit represents a contact with a health professional. This may be for the monitoring and maintenance of health, as a well baby visit, or for the relief and follow up of illness, as a morbidity visit. Therefore, before any comment can be made about the adequacy of health care, it is necessary to examine the purpose of the health care visits, i.e. the number of well baby visits and the number of morbidity visits.

Well Baby Care Visits

The well baby care visit (WBC) is a visit for the purpose of health supervision and monitoring. It provides an opportunity for the health worker to discuss normal infant growth and development, to educate the mother regarding infant rearing practices, to answer her questions regarding feeding, minor behavior problems and other concerns about her infant. It also presents an opportunity for preventive medicine through immunization, monitoring of height and weight and developmental assessment. Attendance of infants at well baby clinics was a good index of the availability of medical service and the degree to which it was utilized. The frequency of well baby care visits by ethnic grouping is presented in Table 8-5.

Table 8-5
WELL BABY CARE VISITS

	INUIT(E)	INDIAN(I)	WHITE(W)	MIXED(M)	OTHER
Mean	8.6	3.7	5.9	5.1	3.6
Std. Dev.	4.7	3.3	2.7	3.1	3.2
No Visit	24	65	12	1	5
Total	433	246	268	65	26

Differences between means[1] I<W; M<E $p<0.05$

[1] Calculated using oneway analysis of variance and Scheffe's procedure for contrasts.

Maximal well baby care should involve six visits at intervals of two months, a recommendation of the American Academy of Pediatrics (AAP, 1977). It was therefore interesting to learn that only the Inuit group averaged this number of visits and that about ten percent of infants had no WBC visits. It is distressing to see that 65 (26.5%) Indian infants had no WBC visits. No other group approached this frequency of total non-attendance. It is possible that some of the infants may have received well baby care in private physicians' offices instead of the public health Well Baby Clinics. These may not have been recorded; however, this is unlikely because efforts were made to ensure that all health contacts were recorded. Table 8-6 presents data summarizing well baby care visits by zone and by ethnicity.

Table 8-6
WELL BABY CARE VISITS BY ZONE AND ETHNICITY

	BAFFIN	INUVIK	MACKENZ'E	KEEWATIN
INUIT				
Mean	7.7	5.5	10.9	10.0
S.D.	4.3	4.0	5.0	4.2
N	200	45	79	109
No Visit	13	7	1	3
INDIAN				
Mean		4.6	3.3	
S.D.		3.6	3.2	
N		74	172	
No Visit		9	56	
WHITE				
Mean	6.0	5.2	5.8	10.3
S.D.	2.3	2.6	2.6	3.5
N	16	39	205	8
No Visit	0	1	11	0
MIXED				
Mean	6.9	4.2	4.4	11.3
S.D.	2.3	3.0	2.7	2.1
N	12	15	35	3
No Visit	0	1	4	0

The striking feature of this table is that in the Baffin zone with 200 Inuit, only 13 defaulted and had no WBC visit as compared to the Indians in Mackenzie where 56 out of 172 defaulted. The average number of WBC visits for the Inuit was 7.7 compared to only 3.3 for the Mackenzie Indians. Thus, not only did Mackenzie Indians have more defaulters, those attending did so with a frequency of one half that of the Baffin Inuit. Comparing the two groups just in the Mackenzie zone shows that the Inuit had 3 times the number of WBC visits but only 1.3 percent defaulters compared to defaults in 32.6 percent of the Indian group. The situation in the Inuvik zone was not as striking, however even here the Inuit attended well baby clinics more faithfully.

Immunization Practises

One of the most important aspects of well baby care is the provision of immunization. A previous study of health in Indian infants in Canada produced evidence that immunization programmes were either very poorly carried out or else were badly reported (Graham-Cumming, 1967). In the present study extra effort was devoted to ensuring adequate reporting and it was anticipated that the statistics relevant to immunization would indicate how effectively the health services had been in carrying out this important public health measure.

For most of the study, the following immunization schedule was followed:

BCG[1] - Birth
DPTP[2] 1 - 2 to 3 months
DPTP 2 - 3 to 4 months
DPTP 3 - 5 to 6 months
Sabin 1 - 7 months
Sabin 2 - 8 months
Live Measles - 9 months

[1] Bacille-Calmette-Guerin
[2] Diphtheria-Pertussis-Tetanus-Polio

In May of 1974, half way through the study, the immunization program was altered and the following schedule implemented:

BCG - Birth
DPTP 1 - 2 to 3 months
DPTP 2 - 3 to 4 months
DPTP 3 - 5 to 6 months
Sabin 1 - 2 to 3 months
Sabin 2 - 3 to 4 months
Sabin 3 - 5 to 6 months
Live Measles - 7 months
M/M/R[3] - 12 months.

[3] Measles-Mumps-Rubella

Since it was unlikely that supplies were distributed throughout the Territories for at least six months after May 1974, and since nurses were advised to use up existing stocks of the previous material prior to following the new regimen, it is likely that few of the infants of this study were subjected to the new schedule.

Tables 8-7 to 8-12 summarize results regarding immunization practices for each ethnic group within each zone. This information was extracted from the data set and assumes that an infant who received live measles vaccine would have completed the DPTP and Sabin series and therefore would have complete immunization. An infant not recorded as receiving live measles vaccine, but having some immunization, was regarded as having partial immunization. BCG will be considered separately.

Table 8-7 summarizes the immunizations for all infants in the study and subdivides them into ethnic groups.

Table 8-7
IMMUNIZATION STATUS BY ETHNIC GROUP OF CHILD

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
None	15	3.5	20	8.1	5	1.9	1	1.5	3	11.5	44	4.2
DPTP-1	391	90.3	203	82.5	258	96.3	60	92.3	23	88.5	935	90.1
DPTP-2	376	86.8	185	75.2	252	94.0	57	87.7	17	65.4	887	85.5
DPTP-3	353	81.5	148	60.2	233	86.9	50	76.9	15	57.7	799	76.9
Sabin-1	324	74.8	124	50.4	219	81.7	50	76.9	14	53.9	731	70.4
Sabin-2	266	61.4	92	37.4	181	67.5	36	55.4	10	38.5	585	56.4
Measles*	209	48.3*	58	23.6*	129	48.1*	27	41.5*	6	23.1*	429	41.3*
DPT	96	22.2	19	7.7	58	21.6	14	21.5	3	11.5	190	18.3

* - those children receiving live measles vaccine constitute the group considered to have complete immunization.

Comments with respect to ethnicity will be restricted to the three major ethnic groups. Overall 41.3 percent (429) infants received complete immunization and only 4.2 percent (44) received no immunization. Seventy-seven percent of the children completed their DPTP immunizations with another 18 percent receiving DPT. Only 56.4 percent (n=585) completed their Sabin polio immunization. While it is comforting to note that only about 4 percent received no immunization, the large percentage with imcomplete immunization is distressing and efforts should be made to rectify this situation.

The ethnic group of special concern regarding immunization is the Indian. Only 23.6 percent (58) of the Indian infants had complete immunization compared to 48.4 percent (209) Inuit and 48 percent (129) White infants. At all levels of immunization, the Indian infant was the most delinquent. Eighty one percent of the Inuit and 87 percent of the White infants completed DPTP immunization, but only 60.2 percent of the Indian infants did so. Only 2 percent of the White infants received no immunization compared to 3.5 percent Inuit and 8.1 percent Indian. These figures show clearly that, while improvement in immunization procedures must be made with all ethnic groups, the group of most urgent concern is the Indian.

Table 8-8 summarizes the immunization practices by region.

Table 8-8
IMMUNIZATION PRACTICES BY REGION

	BAFFIN N=228		INUVIK N=182		MACKENZIE N=508		KEEWATIN N=120	
	N	%	N	%	N	%	N	%
None	8	3.5	19	7.7	22	4.3	0	0
DPTP-1	209	91.7	156	85.7	457	90.0	113	94.2
DPTP-2	203	89.0	140	76.9	438	86.2	106	88.3
DPTP-3	194	85.1	118	64.8	391	77.0	96	80.0
Sabin-1	180	78.9	95	52.2	364	71.7	92	76.7
Sabin-2	157	68.9	74	40.7	282	55.5	72	60.0
Measles*	126	55.7*	49	26.9*	200	39.4*	53	44.2*
DPT	52	22.8	16	8.8	84	16.5	38	31.7

* - considered to signify complete immunization.

The regions of concern are Inuvik with 27 percent complete immunizations and 7.7 percent no immunization and Mackenzie with 39.4 percent complete immunization.

Tables 8-9 and 8-10 subdivide the infants in these regions into their ethnic groupings.

Table 8-9
IMMUNIZATION PRACTICES BY ETHNIC GROUP OF CHILD - INUVIK ZONE

	INUIT N=45		INDIAN N=74		WHITE N=39		MIXED N=15		OTHER N=9		TOTAL N=182	
	N	%	N	%	N	%	N	%	N	%	N	%
None	4	8.9	8	10.8	1	2.6	--	--	1	11.1	14	7.7
DPTP-1	34	75.6	61	82.4	37	94.9	15	100.	8	88.9	156	85.7
DPTP-2	33	73.3	54	73.0	35	89.7	14	93.3	4	44.4	140	76.9
DPTP-3	30	66.7	43	58.1	30	76.9	12	80.0	3	33.3	118	64.8
Sabin-1	18	40.0	35	47.3	28	71.8	11	73.3	3	33.3	95	52.2
Sabin-2	13	28.9	27	36.5	23	59.0	9	60.0	2	22.2	74	40.7
Measles*	5	11.1*	14	18.9*	23	59.0*	6	40.0*	1	11.1*	49	26.9*
DPT	3	6.7	5	6.8	6	15.4	2	13.3	--	--	16	8.8

* - considered to signify complete immunization.

Table 8-10
IMMUNIZATION PRACTICES BY ETHNIC GROUP OF CHILD - MACKENZIE ZONE

	INUIT		INDIAN		WHITE		MIXED		OTHER		TOTAL	
	N=79		N=172		N=205		N=35		N=17		N=508	
	N	%	N	%	N	%	N	%	N	%	N	%
None	3	3.8	12	7.0	4	1.9	1	2.9	2	11.8	22	4.3
DPTP-1	73	92.4	142	82.6	197	96.1	31	88.6	14	82.3	457	90.0
DPTP-2	72	91.1	131	76.2	193	94.2	29	82.9	13	76.5	438	86.2
DPTP-3	71	89.9	105	61.1	179	87.3	24	68.6	12	70.6	391	77.0
Sabin-1	71	89.9	89	51.7	169	82.4	24	68.6	11	64.7	364	71.7
Sabin-2	59	74.7	65	37.8	137	66.8	13	37.1	8	47.1	282	55.5
Measles*	49	62.0*	44	25.6*	89	43.4*	13	37.1*	5	29.4*	200	39.4*
DPT	19	24.1	14	8.2	43	21.0	5	14.3	3	17.7	84	16.5

* - considered to signify complete immunization.

With respect to the three major ethnic groups, in Inuvik zone, both Inuit and Indian have poor immunization, whereas in Mackenzie zone, it is the Indian group, where only 25.6 percent completed their immunizations and 7 percent received no immunization, that stands out as being in jeopardy.

Tables 8-11 and 8-12 summarize the situation by ethnicity in the Keewatin and the Baffin regions.

Table 8-11
IMMUNIZATION PRACTICES BY ETHNIC GROUP OF CHILD
KEEWATIN ZONE

	INUIT		WHITE		MIXED		TOTAL	
	N=108		N=9		N=3		N=120	
	N	%	N	%	N	%	N	%
None	---	---	---	---	---	---	---	---
DPTP-1	102	94.4	8	88.9	3	100.	113	94.2
DPTP-2	95	87.9	8	88.9	3	100.	106	88.3
DPTP-3	85	78.7	8	88.9	3	100.	96	80.0
Sabin-1	82	75.9	7	77.8	3	100.	92	76.7
Sabin-2	61	56.5	8	88.9	3	100.	72	60.0
Measles*	46	42.6*	7	77.8*	--	--	53	44.2*
DPT	29	26.8	6	66.7	3	100.	38	31.7

* - considered to signify complete immunization.

Table 8-12
IMMUNIZATION PRACTICES BY ETHNIC GROUP OF CHILD
BAFFFIN ZONE

	INUIT N=200		WHITE N=16		MIXED N=12		TOTAL N=228	
	N	%	N	%	N	%	N	%
None	8	4.0	--	--	--	--	8	3.5
DPTP-1	182	91.0	16	100.	11	91.7	109	91.7
DPTP-2	176	88.0	16	100.	11	91.7	203	89.0
DPTP-3	167	83.5	16	100.	11	91.7	194	85.1
Sabin-1	153	76.5	15	93.8	12	100.	180	78.9
Sabin-2	133	66.5	13	81.3	11	91.7	157	68.9
Measles*	109	54.5*	10	62.5*	8	66.7*	126	55.7*
DPT	45	22.5	3	18.8	4	33.3	52	22.8

* - considered to signify complete immunization.

Apart from being indicators of health care utilization, it must be remembered that immunization protects the child from a number of extremely serious illnesses. Immunization against diphtheria is particularly important because this disease is endemic in the NWT, even among immunized individuals (Jellard, 1972; Jellard and Gully, 1978) where, although the disease may be mild and generally does not constitute a threat to life, the continuing presence of diphtheria in the NWT makes those who are not immunized particularly susceptible.

Bacillus Calmette-Guerin (BCG) vaccination against tuberculosis has, for many years, been recommended for use shortly after birth for all infants born in the NWT. The use of this agent has been controversial but there is reason to believe that it is effective and should continue to be used in Native newborns (Grzybowski, 1978). Table 8-13 summarizes the use of BCG in the NWT population.

Table 8-13
BCG USE IN THE NORTHWEST TERRITORIES BY ETHNIC GROUP OF CHILD

	INUIT N=433		INDIAN N=246		WHITE N=269		MIXED N=65		OTHER N=26		TOTAL N=1038	
	N	%	N	%	N	%	N	%	N	%	N	%
BCG Yes	380	87.8	185	75.2	216	80.6	51	78.5	18	69.2	850	81.9
BCG No	52	12.2	61	24.8	53	19.4	14	21.5	8	30.8	188	18.1

With the exception of Inuvik Zone, where only 64 percent of infants received BCG, the differences between regions are slight. As is evident from Table 8-13, it is the Indian infant who is most likely not to have received this vaccination, whereas the Inuit infant is most likely to be vaccinated.

Morbidity Visits

The other major component of the health care visit is the morbidity visit. This is a visit for the purpose of diagnosis, treatment or followup of illness. Table 8-14 summarizes the pattern of morbidity visits by ethnicity of the child and by zone.

Table 8-14
NUMBER OF MORBIDITY VISITS BY ETHNICITY AND ZONE[1]

	INUIT(E)			INDIAN(I)			WHITE(W)			MIXED(M)		
	Mean	S.D.	N.	Mean	S.D.	N.	Mean	S.D.	N.	Mean	S.D.	N.
Baffin	18.6	11.9	200	--	--	--	6.3	3.3	16	12.4	6.8	12
Inuvik	13.0	8.5	45	14.8	9.4	74	4.8	3.4	39	10.5	8.0	15
Mackenzie	23.6	15.2	79	11.2	7.1	72	7.2	4.2	205	7.0	3.7	35
Keewatin	24.0	12.3	109	--	--	--	7.8	4.6	8	12.3	12.8	3
Ethnic Group Only[2]	20.4	12.8	433	12.3	8.2	246	6.8	4.1	268	9.1	6.3	65

[1] Values for "OTHER" group were not calculated.

[2] Differences between group means using oneway analysis of variance and Scheffe's contrasts W<I,E; M<E $p<0.05$

The Inuit had the highest number of morbidity visits, averaging 20.4 overall, or about one visit for illness every 18 days. Indian infants averaged about 12.3 visits per year and White infants average about one half this value at 6.8 visits per year. The observed differences in frequency of morbidity visits between the four major ethnic groups are all statistically significant.

Considerable variation in frequency of visits exists between regions for the same ethnic group. For the Inuit, the average number of visits in the Inuvik zone is 13, whereas in the Mackenzie or Keewatin zones the average number is nearly twice this at 24. The variation is least obvious among the White infants and does not appear to be in any regular pattern, although it is similar to the pattern observed for well baby visits and may reflect patterns of health care utilization as much as a propensity to disease. Only 11 infants (1 Inuit, 1 Mixed, 2 Indian and 7 White) had no morbidity visit recorded (Data not shown in tables).

HOSPITALIZATION

Table 8-15
NUMBER OF HOSPITALIZATION EVENTS COMPARED BY ETHNICITY

PLACE OF HOSPITAL	INUIT C[1]	INUIT I[2]	INDIAN C	INDIAN I	WHITE C	WHITE I	MIXED C	MIXED I	OTHER C	OTHER I	TOTAL C	TOTAL I
NWT	301	174	259	114	64	49	20	15	20	8	664	360
S. Canada	66	38	45	31	16	15	2	2	2	1	131	87
Total	367	212	304	145	80	64	22	17	22	9	795	447
% Morbidity Contacts	5.0		13.3		4.9		4.2		10.3		5.9	
% Infants	48.9		58.9		23.8		26.1		34.6		43.1	

[1] Cases, [2] Infants

Table 8-15 shows that there were 795 events of hospitalization occurring among 447 infants. Nearly 85 percent (671) of these hospitalizations occurred among Inuit or Indian infants. The frequency of hospitalization was least among White infants, where only about one-quarter required hospitalization and greatest among Indian and Inuit infants, where nearly 59 percent and 49 percent of infants respectively had to be hospitalized. Zachau-Christiansen (1975) observed that approximately 23 percent of Danish infants required hospitalization in the first year of life, a figure that compares well with the White and Mixed infants of this study but only serves to underline what has already been observed - Native infants do indeed have significantly higher morbidity than do White infants. Among Inuit, White and Mixed infants, hospitalization accounted for about 5 percent of all morbidity visits, whereas among the Indian group hospitalization accounted for nearly 13 percent of all morbidity visits. It is interesting to note that when compared with the Inuit group, a greater number of Indian infants required hospitalization. These two statistics suggest that possibly the Indian infant is not brought to medical attention until it is too late to treat him on an outpatient basis and he requires hospitalization.

Over 80 percent of the hospitalizations were in NWT hospitals; the remainder required elective or emergency transfer to a Southern Canada hospital for therapy. Due to the way the computer data file was constructed, it has not been possible to determine easily the exact reason for transfer to a Southern hospital, but would most likely be due to the need for more sophisticated facilities for investigations and treatment.

THE NATURE OF THE MORBID EVENT

The preceding tables give the reader a general impression that, compared to the White child, the frequency of morbidity visits is excessive for Native children, and for the Inuit in particular, and suggests a high frequency of illness. Every case of illness for each infant was recorded and coded according to H-ICDA (CPHA, 1973) specifications. In order to differentiate between a new disease and a follow-up visit for the same disease, it was decided to code a disease as being a "new event" a maximum of once every 14 days. In the case of diseases which lasted longer than 14 days, efforts were made to determine if a visit was for a recurrence of the disease and therefore a "new event" or if the disease was prolonged, in which case it would not be coded again at that time. It is acknowledged that, in some cases, this led to some extra disease events being recorded, but it was felt by the Committee that this would not be a significant problem. On the other hand, the rule not to code as a new event diseases persisting for more than 14 days may have led to under recording of morbidity in infants with a tendency to prolonged illness or delayed healing. For example, particularly likely are purulent otitis media and perhaps persistent lower respiratory tract disease as well.

All of the diseases coded will not be discussed. Many diseases of a similar nature have been grouped together. Where it is desirable to discuss a disease class more closely, the exact nature of the illness comprising the class will be described.

Table 8-16 outlines the H-ICDA numerical classifications grouped together and the name under which each group will be discussed.

Table 8-16
DISEASE CLASSES AND H-ICDA CODES

H-ICDA CODES	NAME OF DISEASE CLASS
0091-0099	Diarrhoea
0360,3200-3209	Meningitis
0550-0559	Red Measles (Rubeola)
1120-1129	Moniliasis
2800-2859	Anemia
3600	Conjunctivitis
3800-3899	Otitis Media
4600-4654	Acute Upper Resp. Inf.
4790-4862	Pneumonia
4890-4960	Bronchitis
5000-5200	Other Pulmonary Infections
5500-5539	Abdominal Hernia
5280-5289	Stomatitis
5820,5950-5959,5995	Urinary Tract Infection
6800-6819	Boils and Cellulitis
6820-6869	Other Skin Infections
1330	Scabies
6900-6989	Non Infectious Dermatitis
7400-7419	Congenital CNS Anomaly
7440-7479	Congenital CVS Anomaly
7500-7519	Congenital GIT Anomaly
7540-7569	Congenital Skeletal Anomaly
7911-7915	Failure to Thrive
8000-9999	Trauma

Table 8-17 presents the diseases occurring in the ethnic groups and the total population. They are presented with respect to absolute frequency and also case specific morbidity incidence rates(cases). This rate is normally determined as follows:

$$\text{Case specific Morbidity Incidence Rates (cases)} = \frac{\text{New cases of disease during calendar period}}{\text{Population at mid point of period}} \times 1000$$

In this discussion the denominator is the population for the particular group under discussion.

Table 8-17

MORBIDITY EVENTS AMONG NORTHWEST TERRITORIES INFANTS

	OVERALL		INUIT		INDIAN		WHITE		MIXED		OTHER	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
Acute URI	2657	2560	1693	3910	562	2285	243	907	117	1800	42	1615
Otitis Media	1226	1181	887	2049	243	988	55	205	26	400	15	577
Pneumonia	773	745	492	1136	244	992	19	71	15	231	3	115
Diarrhoea	699	673	396	914	160	650	92	343	37	569	14	538
Dermatitis	503	485	190	439	120	488	147	549	36	554	10	385
Skin Infection	450	434	273	630	152	618	15	56	8	123	2	77
Chronic Bronchitis	384	370	158	365	132	537	65	243	16	246	13	500
Anemia	365	352	224	517	117	476	12	45	6	92	6	231
Eye Infection	219	211	126	291	35	142	42	157	13	200	3	115
Moniliasis	216	208	140	323	40	163	25	93	6	92	5	192
Other Lung	202	195	125	289	46	187	27	101	2	31	2	77
Trauma	142	137	78	180	33	134	23	86	6	92	2	77
Failure to Thrive	124	120	64	148	30	122	26	97	4	62	0	0
Scabies	99	95	36	83	59	240	0	0	4	62	0	0
Measles	53	51	27	62	14	57	7	26	3	46	2	77
Congenital Musc.	38	37	12	28	9	37	17	63	0	0	0	0
Cellulitis	27	26	18	42	8	33	0	0	1	15	0	0
Meningitis	22	21	20	46	2	8	0	0	0	0	0	0
Congenital CVS	20	19	10	23	8	33	2	7	0	0	0	0
Congenital CNS	13	13	3	7	10	41	0	0	0	0	0	0
Congenital GIT	12	12	6	14	3	12	3	11	0	0	0	0
Number of Cases	8218		4978		2027		820		300		119	
Rates		7917		11573		8240		3048		4615		4577
Total Number of H-ICDA Codes	10622		6350		2580		1152		394		160	
Rates		10354		14699		10488		4283		6062		6154

A CAUTIONARY NOTE

Before one proceeds to analyze the data of Table 8-17 in greater depth, some caution must be exercised. Two of the main objectives of this study were:

"to identify the nature and frequency of illness occurring during the first year of life;" and "to identify factors (socio-economic, nutritional, hereditary, or other) associated with infant mortality and morbidity".

To answer these questions it is necessary to have the data presented in Table 8-17, yet this table must be interpreted with a great deal of caution because there is reason to believe that, due to various limitations imposed by the practical measurement problems inherent in this type of study, the reliability and validity of these statistics are in doubt.

CONFOUNDING FACTORS

The Accuracy of the Diagnosis

One factor which may have biased a large proportion of the morbidity statistics is the accuracy of the diagnosis. Diagnoses were made by many different individuals, who have varying abilities and degrees of training, in institutions with widely varying diagnostic facilities. Thus, a diagnosis of otitis media by one person may have been to another person a normal variant. Perhaps the difference in some cases between the diagnosis of an illness as a URI or chronic bronchitis or pneumonia was the ability to obtain and correctly interpret a chest X-ray. "Diarrhoea" may in some cases have been a normal variant of infant physiology. Breast fed infants commonly have loose stools, which could easily be misinterpreted as "diarrhoea" by the unknowing physician or nurse.

The Nature of the Illness

The very nature of some illnesses may have acted to bias the sample. It was decided by the Committee that a disease could be coded maximally only once every 14 days and in the case of chronic illness, efforts were made by the coders to determine if this was a new illness or a continuation of a chronic state. Thus the nature of the coding instructions, formulated to safeguard against the overreporting of illnesses, may have led to a bias toward underreporting chronic illnesses.

In some instances, such as chronic bronchitis or nutritional anemia, the chronic nature of the disease was self evident and would be so reported by the nurses or interpreted by the medical record librarian who coded the data. In other instances, such as otitis media, diarrhoea, or upper respiratory tract infections, the nature of the illness was such that most were acute, but some became chronic and these might have tended to be reported incorrectly.

For example, an infant with persisting purulent otitis media might be treated by the nurse or doctor almost continuously over several months for "chronic running ears". Since this was regarded as the same illness, it would only be coded as one event. On the other hand, a child who had been seen several times, but at widely spaced intervals, for "acute purulent otitis media" but who "recovered" in between each episode would have been recorded as having several bouts of otitis media. Thus the first child would be recorded as having one bout of otitis media, the other child recorded as having several bouts and yet the degree of overall morbidity would be nearly the same for each child.

Variation in Health Care Utilization

Another factor acting to confound the data is the utilization of existing health care facilities by residents of the North, and also their perception of what constitutes a "disease" requiring medical consultation. These two factors obviously would influence any estimation of incidence of illness.

One method of determining if there are differences in health care utilization is to examine the frequency of visits for non-illness purposes - e.g. well baby care vs. the frequency of morbidity visits. This can be seen in Tables 8-5, 8-6 and 8-14. Tables 8-5 and 8-6 show that the Inuit has an average of 8.6 WBC visits compared to 5.9 WBC visits for Whites and 3.7 WBC visits for Indians. Table 8-14 shows it is the Inuit who has the highest number of morbidity visits with an average of 20.4 visits/year compared to 12.3 for Indians and 6.8 for Whites. These data suggest that perhaps the Inuit tends to utilize health care facilities significantly more often than the Indian or White, and thus may tend to bias the morbidity data to their detriment. It must not be forgotten however, that the infant mortality rate is greatest among this group.

A previous chapter (Chapter 4, Table 4-11) showed the Inuit to have the highest average number of prenatal visits and now Table 8-17 purports to show the Inuit with the highest frequency of illness. The question arises; are they ill more often or instead, does some factor act to throw them in contact with medical people?

Conversely, the Indian had fewer prenatal or WBC visits than either Inuit or Whites, yet they had the second most frequent number of morbidity visits. Does this mean that they sought medical attention only when ill and hence might have disregarded some "minor" illnesses such as URI or otitis media?

Community Size

A further factor complicating the analysis of data is the observation that health care visits were, with few exceptions, much more common in communities of less than 1000 people compared with communities of over 1000 people. Table 8-18 shows that for the two Native groups, the frequency of well baby care visits, health care visits, morbidity contacts and prenatal visits was greater in the smaller communities.

Table 8-18
FREQUENCY OF MEDICAL CONTACTS COMPARED WITH SIZE OF COMMUNITY

	<1000			> 1000			
	Mean	S.D.	N	Mean	S.D.	N	
NUMBER OF WELL BABY CARE CONTACTS							
Inuit	9.17	4.62	367	5.67	3.84	66	***
Indian	4.39	3.64	118	3.09	2.97	127	**
White	7.06	3.53	32	5.72	2.57	236	*
TOTAL HEALTH CARE VISITS							
Inuit	30.4	14.4	366	20.32	11.88	66	***
Indian	19.10	10.7	118	13.15	6.8	127	***
White	13.16	5.3	32	12.6	4.9	236	
DAYS AWAY BECAUSE OF HEALTH PROBLEMS							
Inuit	13.03	21.7	367	13.33	19.6	66	
Indian	17.09	24.5	118	12.32	20.8	127	
White	1.38	3.8	32	2.27	5.9	236	
TOTAL MORBIDITY CONTACTS							
Inuit	21.38	13.1	367	14.65	10.2	66	***
Indian	14.71	8.9	118	10.1	6.9	127	***
White	6.09	4.4	32	6.9	4.1	236	
TOTAL PRENATAL VISITS							
Inuit	9.23	4.33	367	4.55	3.84	66	***
Indian	6.61	3.62	118	3.89	3.19	127	***
White	7.66	4.1	32	8.31	3.46	236	

Difference between means statistically significant
*** p<0.001; ** p<0.01; * p<0.05, (Student t).

It is important to note that most Inuit live in smaller communities and most Whites in larger communities. These data suggest it is possible that there is greater illness in the smaller community, but an alternate suggestion is that the smaller community lends itself to closer contact of nurse or doctor with parent and infant. Hence minor conditions are more likely to be documented and more serious conditions to be followed more closely. Both factors would tend to bias the statistics describing frequency of illness, especially when the ethnic composition of the communities is considered. Table 8-18 should be assessed with the above thoughts in mind.

PATTERNS OF MORBIDITY

General Comments

In none of the following has an attempt been made, for the specific benefit of this study, to determine the exact viral or bacterial etiology of the illnesses recorded or even to be overly precise about the diagnostic criteria employed in making the diagnosis. Thus, although the statistics presented are similar to those reported by other workers, they cannot be taken as absolute values.

From Table 8-18 it can be seen that in general, among Indians and Inuit, the patterns of morbidity were similar although frequencies were usually greater among the Inuit. The White infant had a somewhat different pattern of morbidity than the two Native groups and in general a considerably reduced frequency. In all groups infections were the most common form of morbidity.

These statistics are similar to those documented by other epidemiologic studies describing disease incidence among poor or developing societies (Maynard and Hammes, 1970; Tonkin, 1970; Prasada Rao, 1972; Mata, 1978) and epidemiologic studies in well developed societies (Zachau-Christiansen and Ross, 1975; Miller, 1960). In nearly all studies reported infectious disease was the most frequent form of morbidity, although there were significant differences in the nature and frequency of the infections.

Maynard and Hammes, in a prospective study of mortality and morbidity among 241 Alaskan Inuit infants showed that 63 percent of recorded morbidity was of an infectious nature. In the present study 66 percent of all morbidity was infectious; among the Inuit the corresponding value was 69 percent, and among the Indian, 66 percent; both values very similar to the Alaskan infants. Among White infants only 51 percent of illnesses were infectious. This is a figure similar to the 58 percent reported by Zachau-Christiansen and Ross in a group of 7342 full term infants who were followed for the first year of life.

The most common illness recorded in every ethnic group was acute URI; however, the Inuit had a rate nearly twice that of Indians and four times that of Whites. Among the Inuit, otitis media was the next most common illness occurring with a frequency of 2049/1000 children; pneumonia was third commonest at a frequency of 1136/1000 children. The second and third most common illnesses for Indian children were also pneumonia and otitis media; however, the frequency was lower at approximately 990/1000 infants in each case. Pneumonia ranked tenth for White infants and otitis media fifth with rates of 71 and 205/1000 children respectively.

For White infants, non infectious dermatitis was the second most common form of morbidity with an incidence of 549/1000 children; this is a rate slightly higher than that of the Indian and Inuit infants and in fact skin disorders in general were one area where the frequency of illness was greater in Whites than Natives. About 14 percent of all morbidity episodes in White infants were accounted for by skin disorders. This compares to about 13 percent for Indians and about 8 percent for Inuit. However, the nature of the skin disorders is different in that non-infectious skin disease accounts for 91 percent of the skin problems of White children, but only 36 percent and 35 percent of the skin problems of Inuit and Indian infants.

Diarrhoea was the third most common illness for White infants with a rate of 343/1000 and was the fourth most common illness of Indian and Inuit infants with rates of 650 and 914/1000 infants respectively.

Thus Table 8-17 shows that three major groups of diseases: upper and lower respiratory tract illness, skin disorders, and diarrhoea account for 68.1 percent, 66.8 percent, and 56.6 percent of all illness occurring in Inuit, Indian, and White infants respectively.

Table 8-19 examines some of the more common illnesses in more detail. Apart from the very obvious differences in morbidity between the ethnic groups, an important observation is that, in virtually every illness, a very significant proportion of infants had no episode of that illness.

Upper Respiratory Tract Infection

Upper respiratory tract infections (URI) were the most common illnesses in all three major ethnic groups. Table 8-19 shows that nearly 92 percent of Inuit infants had at least one URI in their first year, compared to about 73 percent of Indian infants and slightly over one-half (53.8 percent) of White infants. Apart from the general mild and limited misery which accompaies an URI, they were important in that they often were the precursors of more serious illnesses, notably otitis media and pneumonia.

Otitis Media

Otitis media was one of the most important, common, everyday illnesses found in the infants of this study. It occurred at least once in 63.5 percent of Inuit infants, a frequency virtually identical to that recorded by Maynard and Hammes (1970) and Reed and Dunn (1970) among American Inuit. Otitis media occurred in 39.1 percent of Indian infants but only 15.7 percent of White infants were afflicted with this disease. This latter value is similar to the 12.0% reported by Zachau-Christiansen and Ross (1975) and somewhat higher than the 6 percent reported by Miller (1960) in Newcastle-upon-Tyne.

Table 8-19
FREQUENCY OF VARIOUS ILLNESSES BY ETHNICITY

	INUIT		INDIAN		WHITE		TOTAL	
	N	%	N	%	N	%	N	%
Frequency of Otitis Media								
0	158	36.5	150	60.9	226	84.3	534	56.4
1	99	22.9	54	22.0	37	13.8	190	20.0
2+	176	40.6	42	17.1	5	1.9	223	23.5
Chi-Square=83.33 p<0.001								
Frequency of Purulent Otitis Media								
0	336	77.6	219	89.0	267	99.6	822	86.8
1	60	13.9	18	7.3	1	0.4	79	8.3
2+	37	8.5	9	3.7	0	0.0	46	4.9
Chi-Square=71.04 p<0.001								
Frequency of Failure to Thrive								
0	395	91.2	223	90.7	246	91.8	864	91.2
1	20	4.6	17	6.9	17	6.3	54	5.7
2+	18	4.2	6	2.4	5	1.9	29	3.1
Chi-Square=4.95								
Frequency of Skin Infections								
0	274	63.3	166	67.5	254	94.8	694	73.3
1	125	28.9	62	25.2	14	5.2	201	21.2
3+	34	7.9	18	7.3	00	0.0	52	5.5
Chi-Square=88.81 p<0.001								
Frequency of Pneumonia								
0	197	45.5	143	58.1	251	93.7	591	62.4
1	114	26.3	45	18.3	15	5.6	174	18.4
2+	122	28.2	58	23.6	2	0.7	182	19.2
Chi-Square=165.60 p<0.001								
Frequency of Gastroenteritis								
0	205	47.3	140	56.9	199	74.2	544	57.4
1	181	41.8	94	38.2	65	24.2	340	35.9
3+	47	10.9	12	4.9	4	1.5	63	6.6
Chi-Square=56.93 p<0.001								
Frequency of Chronic Bronchitis								
0	333	76.9	154	62.6	219	81.7	706	74.6
1	65	15.0	63	25.6	37	13.8	165	17.4
2+	35	8.1	29	11.8	12	4.5	76	8.0
Chi-Square=27.49 p<0.01								
Frequency of URI								
0	35	8.1	66	26.8	124	46.2	225	23.7
1	61	14.1	55	22.3	78	29.1	194	20.5
2+	337	77.8	125	50.8	66	24.6	526	55.5
CHI SQUARE = 196.36								
TOTAL	433		246		268		947	

Although otitis media is not commonly life-threatening, it is a common disease of poor and developing societies (Tonkin 1970; Prasada Rao, 1972; Golden 1971; Mata, 1978) and its influence on the long term health and development of the child cannot be underestimated. Reed, Struve, and Maynard (1967) and Ling, McCoy and Levinson (1969) have documented the effects of repeated bouts of otitis media on the development of hearing loss and possibly even some impairment in educational achievement.

It is still an open question as to why Inuit infants in particular have such a high incidence of otitis media. Schaefer (1971; Schaefer, Timmermans et al, 1978) has argued that the high incidence of otitis media among these infants is due to the increased frequency of bottle feeding. The data of this study do not support this hypothesis (see Chapter 7 - Table 7-45) nor do they disprove it; however, one reason for this may lie in the nature of the illness and how it has been recorded for analysis (see p.190). Recently (Timmermans and Gerson, 1978) it has been suggested that chronic otitis media is a foreign body reaction to cow milk, thus indirectly supporting Schaefer's hypothesis.

Otitis media is a relatively new disease in the NWT, being uncommon as recently as 20 years ago (Hutton, 1925; Schaefer, 1959). This is another factor suggesting that it may be related to bottle feeding, for it is only in the past 20 years that breast feeding has been on the decline. At any rate, it is evident that the pathogenesis of this disease has not been clearly delineated and that much research remains to be done.

Pulmonary Disease

Pulmonary disease, including pneumonia and chronic bronchitis but not URI, was the next most common type of infection and affected overall 63.0 percent of the study infants. Among Inuit and Indians, over 75 percent had some form of pulmonary infection whereas only about 25 percent of White infants were affected. These figures are similar, but not directly comparable, to those reported by Maynard and Hammes who reported that 68 percent of illnesses were respiratory, not necessarily pulmonary, in nature. The value of 25 percent for White infants is somewhat higher than the value of 19 percent reported by Zachau-Christiansen among Danish infants but it is of comparable magnitude.

Although the incidence of pulmonary disease is less than URI or otitis media, the high frequency is of considerable medical concern for a number of reasons. First, 11 of the infants of this study died of pneumonia. Sometimes this was treated on an outpatient basis. This was a practice not without its risks; at least one child deteriorated rapidly at home, was brought to the nursing station and died shortly after. Episodes such as this illustrate the ease with which a "mild" pneumonia or bronchitis can become a fulminant lethal illness. Secondly, among Native infants particularly, some forms of pneumonia, especially

Adenovirus pneumonia, may leave the child in permanent ill health - a pulmonary cripple (Herbert, Wilkinson et al, 1977; Herbert, Mahon et al, 1967; Fleshman et al, 1968; Chernik and MacPherson 1971). Why Native infants appear particularly susceptible to this particularly severe form of pneumonia is unclear. It has, however, been seen among Maori children living in difficult socio-economic conditions (Lang et al, 1969), suggesting that a major contributing factor is the environment of the child.

Diarrhoea

In this study diarrhoea was not clearly defined and hence the statistics should be cautiously interpreted. Nevertheless, the results show that this potentially very serious illness was common. Among the Inuit and Indian, the relative frequencies of between 43 and 53 percent were similar to those reported by other workers. Only 25.7 percent of White infants had diarrhoea, however, this is a value nearly twice the 12.2 percent reported by Zachau-Christiansen. Diarrhoea is a disease which requires respect. Usually mild and self limited, it can become acutely fulminant and lead to severe dehydration requiring hospitalization and fluid therapy and, as in three infants in this study, can lead to death. Equally important, diarrhoea can become chronic and lead to failure to thrive, malnutrition and increased susceptibility to infection.

Meningitis

Meningitis was one illness which ranked low in frequency but high in importance. There were 22 cases among the study infants, with three deaths. Twenty of these cases were among Inuit infants for an incidence of nearly 5 percent. No unique factors appear to be related to this disease but such a high incidence of such a serious illness is noteworthy and underlines the need to be suspicious of its presence in an infant in whom illness cannot otherwise be totally explained. It must be remembered that in infancy the classic clinical signs of meningitis may not be present and its diagnosis must be based on a high index of suspicion. One infant was sick for six days before the diagnosis of meningitis was entertained. He died (see Chapter 6).

INFANT HEALTH INDICATORS[1]

Thus far, the parameters examined in this chapter have been derived directly from raw data files. They describe a certain picture of infant health, a picture achieved by comparing many single measures such as types of illness, number of well baby visits, immunization status, etc. For certain purposes it is desirable to have a more composite picture of infant health.

With the comprehensive body of data pertaining to infant health that this study provides, there are two strategies for developing measures of infant health. The first strategy is to select a number of partial indicators that summarize particular aspects of the child's health and illness experience. The second strategy is to combine these particular indicators, each incomplete by itself, into a single composite index of infant health.

From these two options, a total of three measures of infant health were constructed, two partial measures and a composite index. The partial measures are the total number of illness episodes experienced during the year and the average severity of the illness episodes experienced during the year. The composite index of infant health is constructed from the information contained in these and from information about mortality and the estimated duration of the child's illness episodes. In all, a total of four pieces of information go into the construction of the composite index.

The details of the construction of these indices are presented in an appendix to this chapter. What follows here is a brief outline of each index.

NUMBER OF ILLNESS EPISODES

This measure is the total number of illness episodes experienced by the child during his first year of life. All episodes are included, whether or not they required hospitalization.

There are properties of the indicator which impair its usefulness. It omits mortality, thus an infant dying in the first month would have few illness episodes and would show up as being relatively healthy. Another shortcoming is that all illness episodes receive equal weight; this results in a measure of infant health which is very crude indeed.

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[1] This discussion about Infant Health Indicators is abstracted from part of a Ph.D. thesis in Medical Sociology by M. Wahn Department of Sociology, University of Winnipeg. It has been included because it presents some new concepts regarding the measurement of health status and it provides some composite measures of the health status of the present population. The text does not document the complete derivation of each indicator, rather it provides only sufficient information for the reader to grasp the concept and to understand its strength and weaknesses. A more complete derivation and explanation of the indicators is provided as an appendix to this chapter.

A third problem is that of utilization bias. The child whose mother takes him to the nursing station or doctor's office for every trivial complaint will appear to be much less healthy than the child who comes into contact with the health system only when seriously ill. Thus the number of illness episodes is less than adequate as a measure of infant health because it is incomplete.

MEAN SEVERITY OF ILLNESS EPISODES

Another measure of infant health is the average severity of the illness episodes the child experienced during his first year of life. Severity is measured on a continuous scale from zero, signifying the state of complete health, to ten, signifying the state of death. The value assigned to each disease would represent not only the relative severity of the disease but also the "healthiness", relative to the states of death and complete health, of a child who has the disease.

An upper limit of eight was arbitrarily imposed on any single illness episode, in order to prevent a few multi-disease episodes from achieving a severity value equal to or greater than death.

Each illness episode a child experienced during the year was assigned a severity value ranging from one to eight. If the child died during the year, this episode was coded with a severity value of ten.

There are several sources of error in this measure of health. First, there is considerable variation in severity among cases with the same diagnosis, variation which to a large extent is lost in this measure. A second source lies in the somewhat empirical method with which severity ratings were assigned to each illness.

A third source of error is the arbitrary method of adjusting severity values for those illness episodes with more than one diagnosis and for those which required hospitalization.

Utilization bias is present in this measure of health. Infants who visit the nursing station regularly for trivial health problems as well as for their more serious diseases will have a low average illness severity, as compared to those infants who receive medical attention only when seriously ill.

Finally, the average severity of illness episodes is inadequate as an overall measure of infant health because it excludes the total number of illness episodes.

MEAN DURATION OF ILLNESS EPISODES

A third partial measure of infant health is the mean duration of the illness episodes experienced by the child during the year. Of little use by itself, this measure will be useful only as a component of the composite measure described later in this chapter.

COMPOSITE INDEX OF INFANT HEALTH - THE HEALTH SCORE

Each of the measures of infant health described above is less than adequate because it is incomplete. The number of illness episodes excludes mortality and considers all episodes equally, ignoring variations in severity and duration among episodes. The mean severity of illness episodes excludes the number and duration of episodes and is inadequate in its inclusion of mortality. The mean duration of illness episodes is of little use as a measure of infant health since it excludes both the number and severity of illness episodes.

The last measure of infant health is a composite index combining mortality and morbidity, with the morbidity component embracing not only the number of illness episodes but also their severity and duration. Because it is complete, this composite index is more valid as a measure of infant health than any of its components.

The minimum score an infant could have would be zero; in this case he would have been stillborn. The maximum score is 100 and would indicate perfect health, or no morbidity contacts, during the first year of life. The distribution of scores is markedly skewed towards the higher values and it should be noted that a health score (i.e. a composite health index) of 80 denotes very poor health. As a rather unlikely hypothetical case, a child hospitalized with pneumonia continuously for eight months, would receive a health score of 80.

For various reasons (see appendix) it was judged necessary to reduce the proportion of variance in the health index contributed by the deaths. This was accomplished by establishing for the index a floor of 80. All cases with a health score less than 80 were adjusted up to 80. This value was chosen because it marks a rough boundary between the health scores of children who lived and the scores of those who died. Only one death, an Inuit child, received a health score above 80 while less than three percent of those who survived the year received scores less than 80. Thus, even raised to 80, the health scores of children who died remained lower than the scores of children who survived. Mortality has not been eliminated from the index.

An advantage of the composite index of infant health is that utilization bias is minimized. The inclusion of severity weights in the index ensures that visits to the nursing station or doctor's office for trivial complaints have only a small effect on health scores. Similarly, the omission of unreported illness episodes, which tend to be of low severity, is less serious when severity weights are employed. Therefore, although utilization bias cannot be completely eliminated in any measure of health derived from utilization data, it is reduced to a minimum level in the composite index.

With the above considerations in mind, Table 8-20 shows the mean values of the various health indicator scores for each of the four large ethnic groups. The Other group was not included in the calculations because of small numbers.

Table 8-20
HEALTH INDICATOR VARIABLES

	INCLUDING CHILDREN WHO DIED			EXCLUDING CHILDREN WHO DIED		
VARIABLE/ETHNIC GROUP	MEAN	S.D.	N.	MEAN	S.D.	N.
HEALTH SCORE						
Inuit(E)	89.97	15.78	428	93.25	5.77	404
Indian(I)	92.69	13.58	236	95.07	4.58	228
White(W)	98.09	6.15	262	98.46	1.49	261
Mixed(M)	97.7	2.20	63	97.70	2.21	63
Differences between means[1],[2]	E<M,W; I<W		p<0.05	E<I<M,W		p<0.05
EPISODES OF ILLNESS						
Inuit(E)	9.80	4.49	428	10.06	4.41	404
Indian(I)	7.31	4.72	236	7.43	4.73	228
White(W)	3.54	2.52	262	3.55	2.52	261
Mixed(M)	5.11	3.42	63	5.11	3.42	63
Differences between means[1]	W,M<I<E		p<0.05	W,M<I<E		p<0.05
MEAN SEVERITY OF ILLNESS						
Inuit(E)	2.20	0.97	428	2.06	0.68	404
Indian(I)	2.16	1.27	236	2.01	0.85	228
White(W)	1.52	0.83	262	1.50	0.71	261
Mixed(M)	1.66	0.67	63	1.66	0.67	63
Differences between means[1]	W,M<I,E		p<0.05	W,M<I,E		p<0.05

[1] Differences between means analyzed using oneway analysis of variance and employing Scheffe's test for contrast and p<0.05.

[2] This statistic should be read as follows: "Group E is significantly different from groups W and M and group I is significantly different from group W".

In every instance the infant in the White group had the best, or healthiest, score. Native infants had more episodes of illness and significantly more severe illness than did White infants. The mean duration of illness was similarly divided between Inuit/Indian and White/Mixed groups. For the "Health Score" the Inuit had the lowest value, 89.97, compared to 92.7 for Indians and 98.1 for Whites. Thus, on average, and considering factors such as severity and duration of illness, the Inuit and Indian groups were significantly less healthy than the White or Mixed groups. When those infants who died are removed from the statistics, the overall health score rises appreciably for the Indian and Inuit groups, but the Inuit group becomes significantly less healthy than the Indian group, and the scores for both groups still remain significantly lower than for Whites.

Due to the concern regarding health care utilization bias in small communities mentioned earlier in this chapter, the health indicator variable scores were compared between those individuals in each of the four large ethnic groups living in communities of less than 1000 people and more than 1000 people.

Table 8-21 shows that Inuit and Indian infants living in small communities had significantly more episodes of illness whereas White and Mixed infants did not. With the exception of Inuit infants, where it was significantly less in small communities, the mean severity of illness was unrelated to settlement size.

The composite variable, the health score, was significantly less among Indians in small communities, but was unrelated to community size for the other three ethnic groups. This last statistic would seem to suggest that the differences observed in Table 8-18 reflect, to a large extent and especially for Inuit infants, health care utilization patterns rather than excessive morbidity in smaller settlements.

Table 8-21
HEALTH INDICATOR VARIABLES COMPARED WITH POPULATION SIZE, BY ETHNICITY

VARIABLE	POPULATION <1000 PEOPLE			>1000 PEOPLE		
ETHNIC GROUP	MEAN	S.D.	N.	MEAN	S.D.	N.
HEALTH SCORE						
Inuit	90.25	14.66	363	88.40	21.04	65
Indian	90.40	16.36	114	94.85	10.01	121^{1}
White	98.80	1.23	32	98.0	6.56	236
Mixed	97.15	2.76	20	97.9	1.88	43
EPISODES OF ILLNESS						
Inuit	10.18	4.24	363	7.69	4.71	65^{2}
Indian	8.74	4.84	114	5.92	4.18	121^{2}
White	2.94	2.14	32	3.63	2.56	236
Mixed	5.70	3.13	20	4.84	3.55	43
MEAN SEVERITY OF ILLNESS						
Inuit	2.12	0.81	363	2.62	1.54	65^{1}
Indian	2.27	1.37	114	2.06	1.19	121
White	1.38	0.75	32	1.54	0.83	236
Mixed	1.78	0.77	20	1.61	0.62	43

Differences between means are statistically significant at:
^{1} $p<0.05$; ^{2} <0.01 (Student t).

The data in Tables 8-20 and 8-21 are useful in demonstrating and quantifying, although in a manner which is certainly open to criticism, the health status of the infants of this study. These data have shown that Native infants, especially Inuit, have significantly worse health than do White infants. They have shown that, although differences in health care utilization appear to exist between small and large communities (Table 8-18), to a large degree and with the exception of Indians, the overall health of individuals is unrelated to community size. Taken together, these last two conclusions may lead to the supposition that there is some relative 'overutilization' of health care facilities in the small communities; however, this is not necessarily undesirable. Firstly, the overutilization is only in relationship to a larger community and it has been shown that it is in the larger community where there is an undesirably low number of public health contacts for purposes such as prenatal care and well baby care (Table 8-18). Secondly, it is the small community where the majority (85%) of Inuit infants and nearly half (48%) of Indian infants live. It is these two groups who are at the greatest risk for poor health. Finally, it may well be that the frequency of use of preventive health care facilities by Inuit and White groups in the smaller communities is near the level desired for good public health care. Thus the correct conclusion one must draw from these data is that instead of overutilization in the small communities there is underutilization in the larger communities. The data available would seem to support this conclusion, not necessarily for illness related health care, but rather for public health care utilization. Certainly the data support the recommendation that nurses working the larger centres actively seek out the families of infants and ensure that they receive adequate well baby care in the form of advice, growth monitoring and immunization.

The health indictors provide a means whereby we can illustrate the fact that good health is not derived solely by providing sufficient medical personnel and facilities. The Inuit had the highest degree of utilization of health care facilities, yet this group had the worst overall health status. The White group utilized preventive health facilities slightly less than the Inuit yet it had a much higher level of health. The Indian group had an "in between" health score yet it had the worst record of utilization of health care facilities. Clearly other factors play an important role in determining health. Further studies are necessary to explore the nature of these non medical determining factors.

Why some infants get ill and others remain well is one of the main questions this study was designed to answer. The next chapter - Predictcrs of Mortality and Morbidity - attempts to answer this question and document those factors which have been statistically shown to be associated with various illnesses.

SUMMARY AND CONCLUSIONS

This chapter has reviewed the status of health care and morbidity among northern infants. Perhaps the most important finding is that very few infants had no access to primary medical care; in fact, for the most part the opposite was true - access to health care was easy and especially in the smaller settlements, well used. Unless warranted for reasons outside the mandate of this study, it appears that there is no need to increase dramatically the number or size of health care facilities in the smaller settlements of the NWT. As will be discussed below, there is a need to improve the pediatric expertise of the medical personnel staffing all levels of health care facility in the NWT.

Another important finding is that among the three major ethnic groups, the Inuit infant had the greatest frequency of illness and also the greatest frequency of use of health care facilities, whereas the Indian infant had the second greatest frequency of illness but was generally last in the use of health care facilities for preventive services. The White infant tended to utilize preventive health care facilities in a manner similar to that seen in Southern Canada although, even with this group, differences existed between large and small communities with respect to frequency of WBC visits and completeness of immunization.

A third general observation is that the frequency of health care visits varied considerably with administrative zone and settlement size. In isolated zones or small settlements, health care visits, immunization practices, and morbidity were all greater than in larger settlements. This was especially apparent for the Native groups and applies to some degree to the White group as well. It must be remembered however that the health status, as measured by the composite index of health, for the most part was unrelated to the settlement size. The above observations suggest that (a) Indians tend to underutilize preventive health care facilities and, (b) utilization of health care facilities is inversely related to settlement size.

Immunization for the basic DPTP, was fairly well completed among the Inuit and White but less thoroughly in the Indian group. In all three major ethnic groups, less than one half completed the full series of immunizations. These statistics are cause for concern for all groups, but again especially for the Indian, in that immunization protects against illnesses which continue to be an ever present threat to life and future health.

The frequency of morbidity varied greatly between the ethnic groups with, when compared to White infants, the Inuit having three times and Indians nearly two times the number of morbid events in the first year. While it is felt by all members of the Committee that Native infants have a greater frequency of illness than White infants, the high frequencies seen, especially among

Inuit infants, may be biased adversely because of health care utilization practices. Nevertheless, the statistics demonstrate a marked discrepancy in frequency of illness between White and Native infants and underline the definite need for qualified medical professionals in all settlements of any size. Equally important, these statistics demonstrate that it is not only health care which determines health status, it is also the socio-cultural environment of the individual.

There was a tremendous variety of types of illness, although the most common were infectious in nature. Many of the illnesses were simple and self limited, some, such as URI and otitis media appeared inevitable; others, such as scabies, were largely preventable; a small number were serious congenital heart or brain lesions which are private tragedies common to all mankind; a few, like meningitis, were acute medical emergencies requiring a high degree of suspicion, early diagnosis and rapid, definitive therapy. Pulmonary infections and gastrointestinal infections were common, especially among the Native groups, and constituted a distinct hazard to health as was shown by the high number of infant deaths due to these illnesses.

To suspect, diagnose, treat, refer when necessary, and follow up such a wide variety of pediatric problems requires an individual with more than passing acquaintance with child health. Indeed, any individual medical professional who practices in an isolated situation, needs to have some formal pediatrics training after graduation, training which should emphasize basic pediatric diagnostic and therapeutic skills.

The larger hospitals of Yellowknife, Inuvik and Frobisher Bay often were places to which ill infants were referred. In these institutions there is a definite need for physicians with interest and expertise in pediatric problems.

In addition to adequately trained professionals, there is the equally basic need of adequate numbers of professionals whose primary responsibility is child health - at the referral patient care level and at the public health level. When the data of this study were being collected there was no pediatrician in the NWT and, at the time of writing (1979) there is only one board-eligible pediatrician in Yellowknife. The data of this study clearly demonstrate the need for a consultant pediatrician, based in Yellowknife, but available to travel as needed to all northern communities, to deal with the more complex problems of child health. He should interact closely with physicians and public health nurses in active practice, and with the maternal and child health consultants of the Department of National Health and Welfare.

In order to provide adequate pediatric care, the facilities used must be of an acceptable standard. For the most part, there was little evidence that facilities were inadequate, relative to the general level of care that was expected to be provided.

However, this is an area that must periodically be modified to meet changing demands.

It is felt that in all nursing stations there should be a minimum of two resident nurses. Failing this, there should be at least one resident nurse and one well trained, cooperative, readily available community health worker. The basis for this is that should a nurse become ill, or should she have an acutely ill individual to manage, she will need extra and competent help. Without this help, the nurse, over a fairly short period of time will become fatigued. Even with the best-intentioned nurse, a lack of a partner may cloud her judgement as to whether or not to admit an ill individual to the station.

APPENDIX
INFANT HEALTH INDICATORS

NUMBER OF ILLNESS EPISODES

This measure is the total number of illness episodes experienced by the child during his first year of life. All episodes are included, whether or not they required hospitalization.

Due to the fact that each child's morbidity file included all morbidity contacts, including follow-up visits, it was necessary to develop two procedures for identifying discrete illness episodes. First, if hospitalization occurred then all records generated during the hospital stay, as well as those generated within three days prior to admission or within three days after discharge, were grouped together as a single illness episode. If the treatment was on an outpatient basis, then all records generated within a time period (usually fourteen days) equal to the estimated average duration of the most serious diagnosis (see below) were grouped together as a single illness episode.

There are properties of the indicator which impair its usefulness. It omits mortality; thus an infant dying in the first month would have few illness episodes and would show up as being relatively healthy. Another shortcoming is that all illness episodes receive equal weight. For example, a month's stay in the hospital with meningitis registers the same degree of morbidity as a mild cold of three days duration. Failure to weight illness episodes in terms of their relative severity results in a measure of infant health which is very crude indeed.

Serious problems arise from this because of the damaging effects of utilization bias. The child whose mother takes him to the nursing station or doctor's office for every trivial complaint will appear to be much less healthy than the child who comes into contact with the health system only when seriously ill. Thus the number of illness episodes is less than adequate as a measure of infant health because it is incomplete.

MEAN SEVERITY OF ILLNESS EPISODES

Another measure of infant health is the average severity of the illness episodes the child experienced during his first year of life. Severity is measured on a continuous scale from zero, signifying the state of complete health, to ten, signifying the state of death.

An attempt was made in this study to use the available information about each episode to derive a measure of episode severity. To this end a sample of 28 Edmonton pediatricians was asked to rate the relative severity of the 15 most common diseases of infancy seen among the infants of this study. These 15 diseases constituted about 80 percent of the morbidity seen in this study. The pediatricians rated each disease on an eleven-point scale from zero to ten, for four different dimensions of severity: (1) the probability that the disease will be fatal if left untreated, (2) the probability that the disease will produce serious disability in later life if left untreated, (3) the average amount of pain and discomfort suffered by the child during the illness and treatment, and (4) the average amount of disruption of normal family life caused by the disease and the treatment. Separate ratings were made of different age groups: infants less than one month of age and infants between one and twelve months of age.

The end points of each scale were defined for the respondents as follows: (1) the probability of death: 0 = "no possibility of death", 10 = "death is certain to occur", 5 = "50 percent chance of death", (2) the probability of serious disability: 0 = "no possibility of serious disability", 10 = "serious disability is certain to occur", 5 = "50 percent chance of serious disability", (3) pain and discomfort: 0 = "no pain or discomfort at all", 10 = "unendurable pain", (4) family disruption: 0 = "no disruption at all", 10 = "disruption equal to that which would have been caused by the death of the child".

Insofar as was possible, an attempt was made to define the two endpoints so that each scale would approximate a continuum from death to complete health. The value assigned to each disease would represent not only the relative severity of the disease but also the "healthiness", relative to the states of death and complete health, of a child who has the disease.

There was substantial agreement among the pediatricians regarding the relative severity of these diseases. The inter-judge reliabilities were very high, ranging from .92 for the pain dimension to .98 for the probabililty of death dimension. Several pediatricians offered the advice that the four dimensions of severity are of unequal importance, that the first two dimensions should be weighted more heavily than the last two. A 4-4-1-1 scheme was chosen as the most appropriate one. A severity score was then computed for each disease by taking the mean of the 28 pediatricians' ratings for that disease, each of the four dimensions weighted appropriately.

The severity scores were rounded to the nearest whole number, producing five classes of diseases with severity scores equal to 1, 2, 3, 4 and 8. A single pediatrician, typical of the general group, then assigned each disease not specifically assessed by the group to one or another of those classes. Thus every diagnostic code used by northern health personnel during the period of the study was assigned a severity score.

Illness episodes were then assigned severity scores according to the diagnoses present and according to whether or not they required hospitalization. When an illness episode had only a single diagnosis and did not require hospitalization, it was assigned the severity score for that diagnosis. However if it required hospitalization its severity value was increased by "1" on the assumption that illness episodes resulting in hospitalization are generally more severe than episodes of the same disease not requiring it. If the illness episode involved more than one diagnosis, then it was assigned a severity value equal to that of the most serious diagnosis plus "1" for each diagnosis with a severity score of 2.0 or more. For example, a six month old child diagnosed as having otitis media, gastroenteritis and pneumonia all at the same time would have received for this illness episode a severity value of 5. If the episode required hospitalization, the severity value would have been increased to 6. An upper limit of 8 was arbitrarily imposed on any illness episode, in order to prevent a few multi-disease episodes from achieving a severity value equal to or greater than death.

Each illness episode a child experienced during the year was assigned a severity value ranging from 1 to 8, depending on the diagnosis involved and depending on whether or not the episode required hospitalization. If the child died during the year, this episode was coded with a severity value of 10.

There are several sources of uncertainty in this measure of health. First, there is considerable variation in severity among cases with the same diagnosis, variation which to a large extent is lost in this measure.

A second possible source of measurement uncertainty is that pediatricians' severity ratings, while highly reliable, were based on their experience with an urban caseload consisting largely of White children. The relative severities of infant diseases might be quite different among Natives of isolated northern settlements.

A third source of uncertainty is the arbitrary method of adjusting severity values for those illness episodes with more than one diagnosis and for those which required hospitalization. It is likely, however, that the assumption upon which these adjustments are based, i.e. that severity increases with the number of different diagnoses involved and with hospitalization, is true in the majority of cases. Hence failure to make these adjustments would likely have resulted in even greater error.

Utilization bias is present in this measure of health. Infants who visit the nursing station regularly for trivial health problems as well as for their more serious diseases will have a low average illness severity, as compared to those infants who receive medical attention only when seriously ill. It is important to note that the utilization bias in this measure is opposite in direction from the utilization bias in the previous health measure, the number of illness episodes. While the propensity to use health services is positively associated with the total number of reported illness episodes, it is negatively associated with the average severity of those episodes (Data not presented in text).

Finally, the average severity of illness episodes is inadequate as an overall measure of infant health because it excludes the total number of illness episodes. Thus a child who experiences a single illness episode of moderate severity during the year will appear sicker than a child with a dozen moderately serious episodes and an additional dozen trivial episodes. The need to combine these two measures, the number of illness episodes and the severity of episodes, is clearly evident.

MEAN DURATION OF ILLNESS EPISODES

A third partial measure of infant health is the mean duration of the illness episodes experienced by the child during the year. Of little use by itself, this measure will be useful only as a component of the composite measure described later in this appendix.

The 28 Edmonton pediatricians were asked to estimate the average duration, from first onset to the complete return to biological health, of each of the 15 common diseases of infancy alluded to above, under the assumption that treatment was undertaken successfully. The estimated duration for each disease was then computed by averaging the doctors' estimates. A single pediatrician then provided estimates of duration for the less common diseases not included on the questionnaire.

An illness episode with a single diagnosis which was treated on an outpatient basis was assigned a duration value equal to the pediatricians' estimate for that diagnosis. If there was more than one diagnosis, the duration value assigned was that of the most severe diagnosis. If the episode required hospitalization, the length-of-stay was chosen as the duration of the episode, except in the small minority of cases in which length-of-stay was shorter than the pediatricians' estimate. In those cases, the pediatricians' estimate for the most severe diagnosis was used, on the assumption that hospitalization occurred during only a part of the episode's duration. If the child died during the year, an additional episode was coded with a duration equal to 365 minus his age in days at death.

Mean duration of illness episodes, as a measure of infant health, has many of the same measurement problems as mean severity. Intra-diagnosis variation is lost as all episodes with the same diagnosis are assumed to have the same duration. Chronic health problems of long duration go unrecognized except when hospitalization is lengthy. The pediatricians estimated the length of time necessary to restore to health White patients who live in Edmonton; their success under conditions in the North might not be achieved so quickly.

COMPOSITE INDEX OF INFANT HEALTH - THE HEALTH SCORE

Each of the four measures of infant health described above is less than adequate because it is incomplete. The number of illness episodes excludes mortality and considers all episodes equally, ignoring variations in severity and duration among episodes. The mean severity of illness episodes excludes the number and duration of episodes and is inadequate in its inclusion of mortality. The mean duration of illness episodes is of little use as a measure of infant health since it excludes both the number and severity of illness episodes.

The last measure of infant health is a composite index combining mortality and morbidity, with the morbidity component embracing not only the number of illness episodes but also their severity and duration. Because it is complete, this composite index is more valid as a measure of infant health than any of its components.

How is such an index constructed? The most common approach to constructing mortality-morbidity measures of health has been to conceptualize health as a continuum stretching from the state of death at one pole to the state of complete health at the other, then to define a number of intermediate health states lying between the two poles. In the case of infant health, for example, a child may be at home with a cold, at home with a mild case of pneumonia, in the hospital with a more serious case of pneumonia, or in the hospital, in critical condition, with meningitis. Each of these health states would occupy a different location on the continuum. If it is possible to estimate how many days during the year a child spent in each health state and if it is possible to assign a value to each state representing its degree of health, then by summing these values across 365 days it is possible to obtain a total health score for the year or, dividing by 365, an average daily health score.

Because most infants are in the state of complete health part of the year and a few are in the state of death part of the year, it is essential that the health values of the intermediate health states bear some logical relation to the values assigned to death and complete health. Thus, the endpoints of the severity scales were carefully defined so that "0" was associated as closely as possible with the state of complete health and "10" as closely as possible with the state of death. It is very difficult to justify any scheme for assigning relative health values to death and the other health states but these values must be assigned, either explicitly or implicitly, if mortality and morbidity are to be combined in a single index (Torrance, 1973).

The composite index is constructed according to the formula:

$$\text{Infant Health} = \left[3650 - \sum_{i=1}^{k}(S_i\ D_i)\right] \times 10/365$$

Where $\sum$ = summation; S_i = the severity of the ith episode;
D_i = the duration of the ith episode; and
k = the number of episodes the child experienced during the year.

If the child died, an episode of death with severity equal to 10 and duration equal to 365 less his age in days at death is included. The result is an index ranging from 0, in the case of a child who died at birth, to 100, in the case of a child who was free of illness every day of the year.

According to this formula an illness episode involving ten days in the hospital with gastroenteritis and otitis media together contributes roughly the same deviation from health as seven separate week-long colds. Each of these has the same effect upon the health index as five days in the state of death. If these appear not be be equivalent, then the validity of the composite index is open to question.

The minimum score an infant could have would be 0: in this case he would have been stillborn. The maximum score is 100 and would indicate perfect health, or no morbidity contacts, during the first year of life. The distribution of scores is markedly steered towards the higher values and it should be noted that a health score (i.e. a composite health index) of 80 denotes very poor health. As a rather unlikely hypothetical case, a child hospitalized with pneumonia continuously for eight months, would receive a health score of 80.

Certain problems arise in the construction of the composite index. The outcome of a single early illness episode can have a profound effect on the child's health score. If upon contracting a serious disease the young infant hovers near death for a while, eventually to recover, his health score will be damaged only slightly. But if his defences are not quite so strong and he succumbs, his health score will be near zero. Disease severity, as well as the values of all variables affecting health, may be imperceptibly different in the two cases; health scores will be vastly different. As a result much of the variation in this index, that very large part contributed by the small number of deaths, may be unexplainable no matter what set of explanatory variables is employed.

On the other hand, the reverse may also be true. When the few early deaths contribute such a disproportionate share of the variation in the health index, a chance association between the occurrence of death and an explanatory variable, one which arises out of the small number of early deaths in the sample, can obscure the true association between that variable and infant health.

For these reasons it was judged necessary to reduce the proportion of variation in the health index contributed by the deaths. This was accomplished by establishing a floor of 80 for the index. All cases with a health score less than 80 were adjusted up to 80. This value was chosen because it marks a rough boundary between the health scores of children who lived and the scores of those who died. Only one death, an Inuit child, received a health score above 80 while less than three percent of those who survived the year received scores less than 80. Thus, even raised to 80, the health scores of children who died remained lower than the scores of children who survived. Mortality has not been eliminated from the index.

This arbitrary adjustment undermines to some extent the careful rationale given above for the construction of the composite health index. However, the index still remains more complete and hence more valid than any of its components. The adjustment procedure has simply minimized a potential source of false inferences.

An advantage of the composite index of infant health is that utilization bias is minimized. The inclusion of severity weights in the index ensures that visits to the nursing station or doctor's office for trivial complaints have only a small effect on health scores. Similarly, the omission of unreported illness episodes, which tend to be of low severity, is less serious when severity weights are employed. Therefore, although utilization bias cannot be completely eliminated in any measure of health derived from utilization data, it is reduced to a minimum level in the composite index.

CHAPTER 9

PREDICTORS OF MORTALITY AND MORBIDITY

by C.W. Hobart

INTRODUCTION

The purpose of this chapter is to attempt to specify somewhat more comprehensively and precisely the circumstances associated with death and with various illness conditions among the sample members. In order to accomplish this, correlation and regression analysis techniques are used. The procedure is generally to look at each indicator of death or illness in turn, for each ethnic group. The reasons for examining separately each ethnic group have been discussed before and relate basically to the very great differences in lifestyles and physical and social environments which commonly exist between the Inuit, Indian, Mixed Ancestry, and White groups into which the sample was divided.

PROCEDURES OF ANALYSIS

The steps followed in the analysis are outlined below. The first step was to select the dependent and the independent variables. The mortality-morbidity indices used as criteria, or dependent variables to be explained, are listed in Table 9-1. The background variables which were used in attempting to explain the variance in each of these criteria for each of the ethnic sub-samples are listed in Table 9-2.

Table 9-1
MORTALITY AND MORBIDITY INDICES USED IN THIS ANALYSIS
The figure in brackets refers to the number of missing cases for each variable.

1. Death of the Infant [0]
2. Number of Morbidity Visits to Health Facilities [0]
3. Morbidity Score [0]
4. Number of Upper Respiratory Infections [0]
5. Number of Pneumonia Infections [0]
6. Number of Chronic Bronchial Infections [0]
7. Diarrhoea Infections [0]
8. Otitis Media Infections [0]
9. Skin Infections [0]
10. Scabies Infections [0]
11. Conjunctivitis [0]
12. Incidence of Small Baby Status [0]
13. Incidence of Failure to Thrive Episodes [0]

Table 9-2

BACKGROUND AND OTHER PREDICTOR VARIABLES USED IN THIS ANALYSIS

The figure in brackets refers to the number of missing cases for each variable. Except where stated otherwise, the scaling is from low to high, or from non-occurrence of an event to occurrence of the event.

01. Birthweight of Baby (Bwt Baby) [12]
02. Ethnicity of Baby (Eth Baby) [0][1]
03. Zone in which mother lived (Zone - Mo) [0][2]
04. Population of mother's place of residence (Pop Mo Res) [1]
05. Flights per week to settlement (Fl/wk-Sett) [1]
06. Hospital delay from settlement (Hosp del) [0]
07. Age of mother (Age Mo) [3]
08. Gravida [95]
09. Duration of breast feeding (Dur Br F) [208]
10. Use of Vitamin Supplements (Vita) [209]
11. Use of Iron Supplements (Iron) [288]
12. Number of other children (No oth child) [159]
13. Mother works (Mo works) [288]
14. Mother's years in hunting camps (Mo-hunt camp) [313]
15. Mother's years of schooling (Mo-school) [205]
16. Father's frequency of employment (Fa-empl)[234]
17. Father's occupation (Fa Occup) [286][3]
18. Father's number of months of employment (Fa-Mo Empl)[269]
19. Father's years of schooling (Fa-school) [286]
20. Father's years in hunting camps (Fa-hunt camp)[416]
21. Total family earnings (Tot earn) [342]
22. Receipt of welfare funds (Welfare)[356]
23. No. of bedrooms in the home (Bed/home) [218]
24. Persons per bedroom (No/bed) [190]
25. Has publicly supplied water supply (Pub Water) [195]
26. Baby carried in Amauti[4] (Baby-Amauti) [206]
27. Mother's consumption of alcohol (Mo-alcohol) [265]
28. Father's consumption of alcohol (Fa-alcohol) [337]
29. Father gets violent when drunk (Fa-vio drunk) [398]
30. Number of persons per household (No/household) [183]
31. Rating: crowdedness of house (Crowd/house) [219]
32. Rating: cleanliness of house (Clean/house) [226]
33. Rating: stress between relatives (Stress Rela) [285]
34. Rating: child care (Child Care) [223]
35. Well Baby Clinic visits (WBC) [0]
36. Prenatal Clinic visits (Prenat Clin) [0]
37. Denver Developmental score at 6 months (Den Dev) [694]
38. Weight change in the mother (Mo-wt change) [353]
39. Adoption [149]

[1] Scaled White, Mixed, Eskimo, Indian.
[2] Scaled Baffin, Keewatin, Inuvik, Mackenzie.
[3] Scaled unskilled to skilled.
[4] As used here the term refers to the traditional way of carrying the baby.

The second step was to use factor analysis on several clusters of the background or independent variables for each ethnic group. The purpose of this was to discover the range of factors which affected these variables. Step three then involved identifying and selecting those independent variables which "loaded" or contributed most heavily to each factor, for each of the ethnic groups. This was necessary in order to include in the stepwise regression analysis only independent variables which were minimally redundant. The fourth step was to correlate the reduced lists of independent variables with the criterion variables. The fifth step was to screen these independent variables to eliminate those which correlated insignificantly with the criteria, in order to arrive at a short list of independent variables to use in the step regression analysis. Such a reduction process was necessary because the computer program to complete the step-wise regression coefficients was able to use a maximum of only six independent variables in each "run". It was performed separately for each dependent variable for each ethnic group.

The sixth step was to run the step regression analyses, a separate analysis for each ethnic group and for each of the dependent variables listed above.

In performing regression analyses there are two ways in which missing data can be handled. "Listwise deletion" involves deletion from the sample of all cases having missing data in any of the variables used in the analysis. "Pairwise deletion" involves deleting only those sample cases having missing data in either of the two variables involved in calculating the correlation coefficients used in the regression analysis. The former is the more statistically appropriate procedure but may result in very substantial erosion of sample size. For this reason pairwise deletion was used in the present analysis, although the missing data columns in Tables 9-1 and 9-2 show that the number of missing cases are considerably higher than they should be for some of the variables. Since the regression analysis is being used for purposes of explanation of events rather than prediction of events, the use of pairwise deletion probably does not detract from the present analysis.

The advantage of the step regression procedure is that it provides an indication of the independent contribution of each independent variable or "predictor" to the variance of the criterion; first by computing the multiple regression equation for all the independent variables, and then successively extracting the variable which independently predicts the highest proportion of the remaining unexplained variance in the criterion. Thus this procedure automatically controls for the intercorrelation which may exist between independent variables, since the R^2 values (the "coefficients of multiple determination") of the independent variables provide an indication of the amount of variance in the criterion which has been explained by the independent variables already utilized in the analysis.

The result of the analysis is a series of independent variables ordered in terms of the strength of their independent relationship with the criterion, with "R^2" figures ranging in size from .00 to a maximum of 1.00, which show the size of the independent relationship of the predictor with the criterion variables. A "+" or "-" sign indicates whether the relationship of the independent variable with the dependent variable is direct (positive), or inverse (negative).

The reader will recall from Chapter 8 that one of the characteristics of the morbidity data was that many of the infants in the study sample, and particularly the Inuit infants, had inordinately large numbers of illness-related visits. Also there was reason to suspect that these high frequencies were invalid in some unknown proportion of cases, the result of the tendency (1) of the mother to seek health care assistance when her baby had insignificant symptoms, or (2) of the nurse to proceed in a cautious and perhaps "overreacting" ways at times, or (3) of the coding routine used which may at times have been applied to code as multiple cases of the same condition what was in fact but a single illness. Depending on the situation, this may have led to over reporting or under reporting of certain illnesses. For example, in Chapter 8, under the section "The Nature of the Illness", the potential for the underreporting of otitis media was discussed. If a child had chronic purulent otitis media and was seen frequently by the nurse, the record would show only treatment for one continuing illness. On the other hand, a child with the same illness, but seen by the nurse only infrequently, may well have been recorded as having separate bouts of the same illness. The effect on the child is the same, but the statistics for the two children are different.

The only way of precisely separating those morbidity visits which were valid from those which were invalid would have been to return to the original data sheets, and recode the morbidity data. However, even this procedure would have been effective only for the last of the three conditions noted above and even then only partially so.

Accordingly the following empirical procedure had to be devised. The assumption is made that those cases showing no contact for a particular illness are probably generally valid, as are those cases showing a single contact for a particular illness. Cases showing two contacts for a particular illness are perhaps more questionable, but are yet accepted at face value. Cases showing higher numbers of contacts for a particular illness may be invalid for any of the reasons cited above. Therefore these cases were recoded so that three or more contacts were coded to have the same value.

In the data analysis redundant step regression analyses were performed on the dependent variables, first using the independent variables in the form in which they were originally coded, and secondly when recoded as described in the paragraph above. The analysis which produced the higher proportion of explained variance was selected for the present discussion. The justification for this apparently pragmatic mode of selection is that where the frequencies were invalidly inflated, the error variance in these frequency scores would be higher, and consequently the explainable variance would be lower. By contrast, where a higher proportion of the variance in the illness frequency scores was explained by the independent variables, it was because the data incorporated less error variance. Thus selection of the coding/re-coding procedure which resulted in the higher proportion of explained variance seems justified because this was inevitably the one with the lower proportion of error variance, and hence the more valid indicator of the morbidity condition in question.

The sample sizes were such that there was no difficulty in performing separate regression analyses for the Inuit, Indian and White samples. However the "Mixed" and "Other" components of the total sample were too small for separate regression analyses to be performed for each of them. Accordingly these two were pooled, and a single regression analysis was performed. In the tables that follow, this combined component is identified as "Mixed".

In the following pages each mortality-morbidity index which was analyzed is considered in turn. First the findings for the total sample with respect to this criterion are presented and discussed. Then the findings for each of the four ethnic sub-samples are considered.

GLOBAL INDICES OF HEALTH

MORTALITY

The first indicator to be considered is mortality. Since there were only 49 deaths among the 1178 infants in the total sample, this is not a very sensitive indicator. It becomes even less so when these deaths are spread across the ethnic groups for there was one death among the Mixed Ancestry babies, and only three among the White babies. Because there were so few Mixed Ancestry and White mortalities, no analysis of these rare deaths was attempted; however, an analysis was made for the total sample and for the Inuit and Indian sub-samples.

The correlations of the independent variables with the mortality index for the total and the Indian and Inuit sub-samples are available. No further reference is made to these correlations; however, they do provide a comprehensive listing of the strength of the individual relationships between the background variables and infant mortality in the NWT.

The results of the regression analyses using mortality as the criterion for the total, Inuit, and Indian samples are found in Table 9-3.

Table 9-3
PROPORTIONS OF VARIANCE IN THE MORTALITY CRITERION
PREDICTED BY BACKGROUND VARIABLES
BY ETHNICITY OF BABY AND TOTAL SAMPLE

	INUIT	INDIAN	WHITE	MIXED	TOTAL
02 Eth Baby					+.019[1]
04 Pop Mo Res		-.012[2]			-.010
09 Dur Br F		-.013			
10 Vita	-.014	-.070			-.026
11 Iron	-.091	-.016			
23 Bed/home	-.013	-.055			-.013
26 Baby-Amauti	-.012				
35 WBC		-.016			-.062
Total	.130	.182			.130

[1] + signifies a direct or positive relationship between the independent and dependent variables.

[2] - signifies an inverse or negative relationship between the independent and dependent variables.

The data show that for each of the three samples, survival of the infant is very poorly predicted by the background data available to us. In the case of the best predicted sample (the Indian sample) only about 18 percent of the variance in the mortality criterion is predicted by the background variables available. Proportions for the total and the Inuit samples predicted are 13 percent and 13 percent respectively.

In the total sample, the ethnicity of the baby accounted for only two percent of the variance in the mortality criterion. This seems significant in demonstrating that it is not ethnicity per se which is associated with high mortality. Generally the data point to the significance of consulting with the nurse, indexed by the number of well baby visits which the mother made, and of preventive care, indexed by taking vitamin supplements, in preventing infant mortality irrespective of ethnicity. These two variables together predicted two thirds of the explained variance in the survival criterion. Note however it is possible that all three of these relationships may be due to their correlation with age, since some infants may not have lived long enough to attend Well Baby Clinics or to start taking iron and vitamin supplements. The rest of the explained variance was predicted by low inverse associations of the mother's place of residence, and the number of bedrooms in the home with the mortality criterion. These suggest that infants from larger settlements and those living in larger homes have a very slight survival advantage as well.

In the Indian sample, 18 percent of the variance in mortality is predicted by the independent variables available. The most powerful predictor is the variable dealing with vitamin supplements. It is again inversely associated with the mortality criterion. The second most powerful is the number of bedrooms, followed by four more which explain a slight but significant amount of the variation in the criterion: the size of the mother's place of residence, the duration of breast feeding, ingestion of iron supplements, and attendance at well baby clinics. All of these are inversely associated with thc mortality criterion.

In the Inuit sample, 13 percent of the variance in mortality is predicted by the independent variables. The most powerful predictor is the variable dealing with the use of iron supplements and it is inversely associated with mortality. Again this is taken to be an index of the mother's concern for the health of her child as reflected in her following the nurse's advice. Four other variables, all inversely related to the criterion mortality, explain slight but significant amounts of variation in mortality: ingestion of vitamin supplements, the number of bedrooms in the home, and whether and how long the baby was carried in the amauti (inside the mother's traditional parka).

The pattern which emerges from these data is relatively consistent for all three samples although it is far from complete in terms of adequately explaining why infant deaths occur in the Northwest Territories. The most important characteristic associated with mortality of the baby appears to be the failure to obtain the advice of health care agents such as nurses, or to utilize health care services as reflected by the use of vitamin and iron supplements. Inadequate housing, and living in a small, rather than a large, settlement are also associated with infant death. For the Inuit infants not to have a more traditional mother is also weakly associated with greater probability of mortality.

MORBIDITY VISITS

A second global index used in this study was the number of morbidity visits of the child. The data in Table 9-4 show that 30 percent of the variance in the total sample is explained by the predictors.

Table 9-4
PROPORTIONS OF VARIANCE IN NUMBER OF MORBIDITY
VISITS PREDICTED BY BACKGROUND VARIABLES
BY ETHNICITY OF TOTAL SAMPLE

	INUIT	INDIAN	WHITE	MIXED	TOTAL
01 Bwt Baby		+.009[1]		-.029*[2]	
02 Eth Baby					+.183
03 Zone - Mo			+.047		
06 Hosp del		+.133			+.067
07 Age Mo				+.013	
09 Dur Br F			-.021		
11 Iron	+.010	+.039	+.017	+.085	
12 No oth child		+.037			
14 Mo-hunt camp				+.027	
20 Fa-hunt camp				+.027	
21 Tot earn		-.047			
22 Welfare	+.018				+.014
24 No/bed					+.024
26 Baby-Amauti	-.074			-.008	
29 Fa-vio drunk		+.062			
35 WBC		+.029	+.035	+.040	
36 Prenat Clin					+.016
Total	.108	.356	.120	.203	.304

[1] + signifies a direct or positive relationship between the independent and dependent variables.

[2] - signifies an inverse or negative relationship between the independent and dependent variables.

The most powerful predictor is ethnicity, which explains 18 percent of the variance in the morbidity visits index or 60 percent of the total explained variance. Native children had more morbidity visits than White, and Inuit children had the most of all. The hospital delay factor is strongly and directly associated with the criterion. Other directly but weakly associated variables are the number of persons per bedroom in the baby's home, the number of prenatal visits, and receipt of welfare funds. These data suggest the most morbidity visits involved Native children living in small isolated communities born to poor families in crowded homes and who had mothers attentive to the nurses' instructions.

There are considerable differences between the ethnic groups in the amount of variation in this criterion which was predicted by the independent variables. The relationships were strongest for the Indian sample with 36 percent of the variance explained, followed by the total sample with 30.4 percent of the total variance .explained, the Mixed Ancestry, (20 percent) the White (12 percent) and the Inuit (11 percent) samples.

The most powerful predictor for the Indian sample was the hospital delay factor, indicative of geographical and (Southern

Canadian) cultural isolation, followed by the indicator of alcoholic violence in the father, the total family earnings, the use of iron supplements, number of children in the family, number of well baby visits, and the birth weight of the baby in that order. All were directly associated with morbidity with the exception of family earnings. Generally these data suggest a rather classical picture: those Indian children with more morbidity contacts are from the more isolated settlements, from poorer, larger families having alcohol problems and having less acculturated mothers. The two exceptions to the expected pattern are that the number of morbidity contacts is directly associated with the ingestion of iron supplements and with number of well baby contacts. One interpretation would be that mothers whose infants experience more illness are more frequently urged by the nurses to give iron supplements and more frequently comply. They may also, more frequently take the baby to well baby clinics, perhaps because of greater concern for the state of the babies' health. On the other hand, perhaps it is those infants with the most conscientious mothers whose illness most frequently becomes a matter of official record. A third possibility is that the iron supplement - if taken in the first two to three months of life - will predispose the infant to certain types of illness such as diarrhoea (see Chapter 7, Table 7-52).

The second interpretation would definitely appear to be the valid one in the cases of the Mixed Ancestry babies. The two most powerful predictors, - iron supplements and attendance at well baby clinics - are both positively associated with number of morbidity visits. The next two significant predictors are in the expected direction - birthweight of the baby inversely related, duration of father's experience in hunting camps directly related - but in both cases the relationships are weak. Thus this pattern of relationships seems to suggest that it is perhaps the over-careful anxious mother whose baby has the most morbidity visits.

For the White sample the most powerful predictor is the isolation of the zone in which the family lived followed by the number of well baby visits. Both are directly related; this suggests again that it is the more anxiously careful mothers whose infants have the most morbidity visits. Ingestion of vitamin supplements is also directly associated with the number of morbidity visits. Duration of breast feeding is inversely associated with number of morbidity visits, but the relationship is a relatively weak one.

The pattern of relationships for the Inuit infants is generally weak. The strongest relationship shows an inverse relationship with carrying the baby in the amauti -- the mother's parka -- suggestive of the traditional practices of the less acculturated settlements of the NWT. Use of iron supplements and receipt of welfare support are directly associated with morbidity visits, but weakly so.

THE MORBIDITY SCORE

An attempt was made to create a "morbidity score" for each infant based on his total health record. It was felt this score would provide a rough index to compare total morbidity between infants. The method of construction of the morbidity score index involved weighting out-patient contacts less heavily than the number of days of in-patient care, but weighting the latter in such a way that lengthy hospital stays were weighted relatively less heavily per day than were hospital stays of up to two to three weeks. The reason for this was that in the cases of Native infants which have been evacuated from the North, the practice in Southern hospitals is commonly to retain them "over-long" in an attempt to insure that the baby is in very good health at the time that it is returned to the North. In such cases the latter days of hospitalization are not associated with actual illness in the infant.

The data showing the results of regression analysis of these morbidity scores with the background variables used in this study are found in Table 9-5.

Table 9-5
PROPORTIONS OF VARIANCE ON MORBIDITY SCORE PREDICTED BY BACKGROUND VARIABLES, BY ETHNICITY OF BABY

	INUIT	INDIAN	WHITE	MIXED	TOTAL
01 Bwt Baby				-.037[2]	
02 Eth Baby					+.344[1]
03 Zone - Mo			-.015		
06 Hosp Del.	+.015	+.129			+.032
09 Dur Br F		-.023	-.022		
10 Vita	+.019				
11 Iron	-.011	+.065	+.014	+.069	+.012
17 Fa Occup		-.007			+.012
20 Fa-hunt Camp				+.023	
22 Welfare		+.047			+.015
24 No/bed	-.011				
26 Baby-Amauti	-.077				
29 Fa-vio drunk				+.011	
35 WBC			+.126	+.105	
36 Prenat Clin		+.034	+.027		+.012
Total	.133	.305	.204	.245	.427

[1] + signifies a direct or positive relationship between the independent and dependent variables.

[2] - signifies an inverse or negative relationship between the independent and dependent variables.

These data show that morbidity scores are best predicted for the total sample, followed by the Indian, the Mixed Ancestry, the White, and the Inuit sub-samples, just as in the case of the morbidity visits indicator.

For the total sample, a total of 42.7 percent of the variance in the morbidity core criterion was predicted by the independent variables used. The most powerful predictor was ethnicity; which explained 34 percent of the variance in the criterion. Native ethnicity was associated with greater morbidity than Mixed Ancestry or White ethnicity. The second most powerful predictor was the hospital delay factor (the amount of time that it would take to reach the hospital) which was directly associated with the criterion. This was followed by use of iron supplements and receipt of welfare funds, both directly associated with the morbidity score.

The background variables predicted 30 percent of the variance in the case of the Indian sub-sample. Here the most powerful predictor was the hospital delay factor, followed by use of iron supplements, receipt of welfare, and prenatal visits, all directly associated with the criterion. Duration of breast feeding and the level of the father's occupation were both weakly and inversely associated. Again these Indian data conform to the expected pattern of the association of greater illness with isolation and poverty. Taking iron supplements and the number of prenatal visits are again associated, not with low but, with high morbidity scores.

The table shows that about 24 percent of the variance in the criterion was predicted for the Mixed Ancestry sample. Generally, the data show much the same pattern as in the case of the morbidity visit data, suggestive that perhaps it is the infants of the more anxious, over-careful mothers who have the highest morbidity scores. Thus again the strongest relationships are direct relationships with the number of well baby care visits and use of iron supplements. Only thereafter are found relationships such as would be expected, an inverse relationship with birth weight, a direct relationship with the father's years of living in hunting camps, and a weak direct relationship with tendencies toward drunken violence in the father.

About 21 percent of the variance in the criterion was predicted by the independent variables in the case of the White sample. The strongest relationships are again direct ones between morbidity scores and attendance at well baby clinics, number of prenatal contacts, and use of iron supplements. As expected, the relationship with duration of breast feeding, though slight, is negative. Another expected, but very weak relationship was with the zone in which the mother lives; mothers in the more isolated zones have infants with somewhat higher morbidity scores. Thus these relationships for the White sample members tell us nothing significant concerning the broad conditions under which illness is more frequent in the White babies.

Only 13.3 percent of the variance in the criterion was predicted for the Inuit sample. The major implication of the data with respect to the morbidity scores of the Inuit infants is that it is the more traditional mothers, from the less isolated locations, whose infants have lower morbidity scores. Thus carrying the baby in the amauti is inversely associated with the criterion, while hospital delay was directly associated. Use of iron supplements is inversely related as one would expect, though minimally. Use of vitamin supplements is directly related to the criterion however and the crowding index is inversely related. Thus, 13.5 percent of the variance is explained in toto, but in the case of the last two variables, predicting 3 percent of the variance, the relationship is paradoxical.

DATA FOR SPECIFIC MORBIDITY CATEGORIES

When we turn to the data showing the relationships between the specific disease categories and the background variables, the patterns found in this study are generally similar but in many cases more distinct than those reported above.

UPPER RESPIRATORY INFECTIONS

The data in Table 9-6 show the relationships between the background variables and upper respiratory infections in the study sample.

Table 9-6
PROPORTIONS OF VARIANCE IN NUMBER OF UPPER RESPIRATORY INFECTIONS SUFFERED BY SAMPLE BABIES EXPLAINED BY BACKGROUND VARIABLES, BY ETHNICITY OF BABY

	INUIT	INDIAN	WHITE	MIXED	TOTAL
02 Eth Baby					+.202[1]
04 Pop Mo Res		-.155[2]			-.013
09 Dur Br F	-.024	-.076	-.015		
10 Vita					+.011
13 Mo works			+.009		
14 Mo-Hunt Camp				+.013	
17 Fa Occup	+.044				
18 Fa-Mo Empl		-.070			
24 No/bed		+.011		-.034	
26 Baby-Amauti	-.221			-.262	-.073
29 Fa-vio drunk		-.025			
35 WBC	+.099	-	+.049	+.110	
36 Prenat Clin		+.010			
Total	.388	.347	.073	.419	.299

[1] + signifies a direct or positive relationship between the independent and dependent variables.
[2] - signifies an inverse or negative relationship between the independent and dependent variables.

The relationships are best explained in the Mixed Ancestry and Inuit sub-samples followed by the total sample and the Indian and the White sub-samples.

The data for the total sample show that about two thirds of the 30 percent total explained variance is predicted by the ethnicity of the child. Carrying the baby in the traditional way was strongly and inversely associated with the criterion and there was a weak inverse relationship with the size of the mother's place of residence. There was a weak positive relationship with use of vitamin supplements; this may reflect a tendency for those who are careful in following the nurse's nutritional advice to seek the help of health care agents when their infants have respiratory infections.

The data for the Mixed Ancestry sub-sample in Table 9-6 show that 42 percent of the variance in the criterion was predicted for this sub-sample. The most powerful predictor was that of carrying the baby in the traditional way; this was inversely related to the criterion. The next best predictor was the number of well baby visits to the nursing station made by the mother and baby, and which was directly related. The crowding index (number of persons per bedroom) was weakly and inversely related to the criterion, while the number of years spent by the mother in hunting camps was directly, but very weakly, related. Generally these data suggest that among Mixed Ancestry children the incidence of this disease was inversely associated with traditional child care practices and with crowding, and was directly associated with the tendency to take the child to the nursing station, no doubt resulting in the tendency for milder cases to become a matter of official record more commonly among these infants than among infants of mothers less oriented toward use of the nursing station resource.

The relationships for the Inuit sub-sample show that 39 percent of the variance in the criterion was predicted for this sub-sample and that the pattern of relationships is very similar to that for the Mixed Ancestry sub-sample. Again the strongest predictor was that of carrying the baby in the amauti which was inversely related to the criterion. The next strongest predictor was that of number of well baby visits which was directly related. The level of the father's occupation and duration of breast feeding were both weakly and inversely associated with the number of upper respiratory infections suffered by the baby. All of these relationships are quite in accord with prior expectation.

The data show that for the Indian sub-sample 35 percent of the variance in the criterion was predicted and again the relationships are generally as expected. Upper respiratory tract infections were very strongly and inversely associated with the size of the mother's place of residence, duration of breast feeding, and with the number of months that the father was employed during the preceding year. The number of respiratory infections was rather weakly and inversely associated with the father's tendencies toward violent drunkenness, and weakly and directly associated with the crowding index and with the number of prenatal visits which the mother made to the nursing station.

Thus settlement size, reflective of good access to medical facilities, prolonged nursing, and a good level of wage income are associated with low incidence of respiratory infections in this Indian sample.

With only 7 percent of the variance explained, the White sample showed the weakest pattern of relationships between the background variables and the number of upper respiratory infections suffered by the baby. The data show that such infections are most strongly directly associated with number of well baby visits and with employment of the mother. The criterion is inversely associated with duration of breast feeding, but very weakly.

PNEUMONIA

The pattern of relationships for pneumonia (Table 9-7) shows that this condition is much less well predicted by the independent variables than was the upper respiratory infection variable.

Table 9-7
PROPORTIONS OF VARIANCE IN NUMBER OF PNEUMONIA INFECTIONS SUFFERED BY SAMPLE BABIES EXPLAINED BY BACKGROUND VARIABLES, BY ETHNICITY OF BABY

	INUIT	INDIAN	WHITE	MIXED	TOTAL
02 Eth Baby					+.139[1]
08 Gravida				+.038	
09 Dur Br F	-.016	-.037[2]	-.008		-.025
11 Iron			+.025		
12 No oth child		+.047			+.006
13 Mo works				+.013	
17 Fa Occup		-.010			
20 Fa-hunt camp				+.035	
22 Welfare	+.042	+.031			+.012
25 Pub Water		+.017			
26 Baby-Amauti	-.132	-.110			-.027
28 Fa-alcohol				-.083	
29 Fa-vio drunk		+.015			
30 No/household	+.009	-.028			
31 Clean/House				-.021	
36 Prenat Clin				+.039	
Total	.199	.295	.033	.229	.209

[1] + signifies a direct or positive relationship between the independent and dependent variables.

[2] - signifies an inverse or negative relationship between the independent and dependent variables.

The relationships are strongest for the Indian sub-sample, followed by the Mixed Ancestry sub-sample, the total sample, the Inuit, and the White sub-samples, in that order.

The data on the total sample show that 21 percent of the variance in the criterion was predicted; of this, ethnicity of the baby accounted for 14 percent. Lengthy breast feeding of the infant and carrying it in the amauti were both inversely associated with pneumonia infections, while receipt of welfare funds and the number of other children in the family were weakly but positively associated with the criterion.

The data for the Indian sub-sample show that 30 percent of the variance in the pneumonia incidence data was predicted by the independent variables. The strongest relationship is the inverse one between the criterion and carrying the baby on the mother's back. Presence of other children in the home, receipt of welfare funds, and tendencies toward drunken violence are directly associated with the criterion, while duration of breast feeding, level of the father's occupation, and the number of persons in the house are all inversely associated with the criterion. Generally these data suggest that low incidence of pneumonia is found in larger households where more traditional forms of baby care are practiced, but where there is adequate income and not too many other children in the home.

Among the Mixed Ancestry sub-sample, 23 percent of the variance in the criterion was predicted by the independent variables. The strongest relationship is an inverse one with father's consumption of alcohol. The reason for this is probably that it is the more affluent fathers who drink more and whose infants are sick with pneumonia less often. (Note that family earnings was not one of the independent variables used in this analysis.) Pneumonia is also directly associated with the number of previous pregnancies of the mother, her number of prenatal visits, and the father's years spent in a hunting camp. A positive relationship was found with employment of the mother and an inverse relationship with rated cleanliness of the house. These latter relationships are all as anticipated.

The data show that for the Inuit sub-sample 20 percent of the variance in the incidence of pneumonia is predicted by the independent variables. As with the Indian sub-sample the strongest relationship, an inverse one, is with carrying the baby in the amauti. The criterion is also directly associated with receipt of welfare funds and with the crowding index, and inversely associated with duration of breast feeding. The latter two relationships, though statistically significant, are very weak ones. The basic pattern is in accord with expectation; generally the data show that among the Inuit and Indian sub-samples it is the households with more income and those which practice traditional child care methods which offer the best protection against pneumonia.

The data for the White sample show that only 3 percent of the variance in incidence of pneumonia is predicted by independent variables. Pneumonia incidence was found to be directly associated with taking iron supplements and inversely associated with duration of breast feeding.

CHRONIC BRONCHITIS

Data on the relationships between incidence of chronic bronchitis and the background variables used in the regression analysis are found in Table 9-8.

Table 9-8
PROPORTIONS OF VARIANCE IN NUMBER OF CHRONIC BRONCHITIS INFECTIONS SUFFERED BY SAMPLE BABIES EXPLAINED BY BACKGROUND VARIABLES, BY ETHNICITY OF BABY

	INUIT	INDIAN	WHITE	MIXED	TOTAL
02 Eth Baby					+.016[1]
03 Zone-Mo			+.026		
08 Gravida				+.040	
09 Dur Br F	-.027[2]	-.037	-.022		-.023
13 Mo works			+.016		
14 Mo-hunt camp	-.011			+.028	
17 Fa Occup		-.010			
18 Fa-Mo Empl				-.028	
21 Welfare		+.031			+.011
24 No/bed	-.015			-.046	
25 Pub Water		+.017			
26 Baby-Amauti	-.008	-.110		+.031	
28 Fa-alcohol				-.019	
29 Fa-vio drunk		+.015		-.025	
32 Clean/house				-.021	
Total	.061	.220	.064	.238	.050

[1] + signifies a direct or positive relationship between the independent and dependent variables.

[2] - signifies an inverse or negative relationship between the independent and dependent variables.

These data show that incidence of chronic bronchitis infections are best predicted for the Mixed Ancestry sub-sample, followed by the Indian, the White, and the Inuit sub-samples in that order. It is least well predicted for the total sample.

The data for the total sample show that only 5 percent of the variance in the criterion is predicted by the independent variables. Ethnicity predicted only 1.6 percent of the variance in the criterion. Duration of breast feeding is weakly and inversely associated. Receipt of welfare funds has a weak direct relationship with the criterion.

The data in the table show that for the Mixed Ancestry sub-sample 24 percent of the variance in the chronic bronchitis infection index is predicted by the independent variables. There are many significant predictors but none are very strongly associated with the criterion. A direct relationship with the chronic bronchitis index was found for number of previous pregnancies, mother's years in a hunting camp, and carrying the baby in the traditional fashion. Inverse relationships were found with father's number of months of employment, the crowding index, father's consumption of alcohol, father's tendencies toward drunken violence, and rated cleanliness of the house. Generally these data suggest that low incidence of chronic bronchitis is experienced by infants from more affluent and uncrowded homes. These infants have more acculturated mothers who have had few pregnancies and fathers who drink.

For the Indian sub-sample 22 percent of the variance in the bronchitis infection index is predicted by the independent variables. The strongest relationships are the inverse relationship with duration of breast feeding and the direct relationship with receipt of welfare funds. The level of the father's occupation and carrying the baby in the traditional way were also inversely associated with the criterion. However, having a public water supply and father's tendencies toward drunken violence were directly associated with the criterion. With the exception of the weak relationship with having publicly supplied water, an observation which is discussed later in this chapter, these relations are generally expected.

Only 6 percent of the variance in the bronchitis infection index was predicted by the independent variables for the Inuit sample. The data in the table show that chronic bronchitis was inversely associated with the duration of breast feeding, the crowding index, the father's years of experience in hunting camps, and carrying the baby in the amauti. All are expected relationships.

Among members of the White sample, only 6 percent of the variance in the criterion was predicted by the independent variables. The data in the table show that chronic bronchitis was associated directly with residence in the more isolated zones, and employment of the mother, and inversely with duration of breast feeding. All of these are weak relationships.

DIARRHOEA

The data in Table 9-9 show that variation in incidence of diarrhoea infections was very well predicted by the independent variables for the Mixed Ancestry sub-sample, poorly predicted for the Indian sub-sample, and very weakly predicted for the Inuit and White sub-samples and the total sample.

The data show that 5 percent of the variance in the criterion for the total sample was predicted by ethnicity of the baby. The only other significant predictor was the tendency of the father toward drunken violence, which was directly associated with the criterion.

Table 9-9
PROPORTIONS OF VARIANCE IN NUMBER OF DIARRHOEA INFECTIONS SUFFERED BY SAMPLE BABIES EXPLAINED BY BACKGROUND VARIABLES, BY ETHNICITY OF BABY

	INUIT	INDIAN	WHITE	MIXED	TOTAL
02 Eth Baby					+.050[1]
09 Dur Br F				-.082[2]	
12 No oth child		+.028			
14 Mo-hunt camp				+.049	
15 Mo-school			-.017		
18 Fa-Mo Empl				-.041	
24 No/bed		-.031	-.008	+.020	
25 Pub Water	-.021				
26 Baby-Amauti	-.006				
28 Fa-alcohol		+.012		-.093	
29 Fa-vio drunk		+.054		+.283	+.010
30 No/household	-.029				
36 Prenat Clin			+.020		
Total	.056	.125	.045	.568	.060

[1] + signifies a direct or positive relationship between the independent and dependent variables.

[2] - signifies an inverse or negative relationship between the independent and dependent variables.

Among the members of the Mixed Ancestry sub-sample no less than 57 percent of the variance in the criterion was predicted by the independent variables. The best predictor of diarrhoea infections was also the father's tendency toward drunken violence, a direct relationship which predicted about half of the explained variance. Crosstabulation analysis shows that this tendency is more characteristic of Native than of White fathers of these Mixed Ancestry babies (Data not shown). Duration of breast feeding was rather strongly and inversely associated with the criterion as was number of months of father's employment and the father's consumption of alcohol. The latter variable serves to index some measure of affluence and/or White status in this context. A high incidence of diarrhoea infections was directly associated with mother's years in a hunting camp and with the crowding index.

Generally these data suggest that a low incidence of diarrhoea infections is associated with less crowded home situations in which the father has steady employment and consumes moderate amounts of liquor, while the mother had few years in hunting camps and nurses the baby for a long period. As noted earlier, we suspect that the relationship with alcohol consumption is explained by affluence and by the fact that most of the drinking fathers were White. Mixed Ancestry infants having White fathers may experience less incidence of diarrhoea than such infants having Native fathers, because of income differentials, a suggestion substantiated by a correlation of .22

(not shown in the table) between the criterion and number of months that the father was employed.

The data in the table show that 12.5 percent of the variance in incidence of diarrhoea infections among Indian infants was predicted by the independent variables. In this sample, incidence of diarrhoea was directly associated with alcohol consumption, drunken violence in the father, and with having many children in the home. It is inversely associated with the crowding index. What the explanation should be for this latter inverse relationship or for the fact that it contradicts the relationship with number of children in the family is not known. The correlation coefficients are of about the same order of magnitude, - .19 and +.20 respectively (not shown in the table).

The data show that only 5.6 percent of the variance in incidence of diarrhoea infections among Inuit infants was predicted by the independent variables. The criterion is inversely associated with the total number of people in the household and with having publicly rather than privately supplied water.

In the White sample, only 4.5 percent of the variance in the criterion was predicted. Diarrhoea is associated inversely with the mother's schooling and the crowding index and directly with the number of well baby clinics attended.

OTITIS MEDIA

Table 9-10
PROPORTIONS OF VARIANCE IN NUMBER OF OTITIS MEDIA INFECTIONS SUFFERED BY SAMPLE BABIES EXPLAINED BY BACKGROUND VARIABLES, BY ETHNICITY OF BABY

	INUIT	INDIAN	WHITE	MIXED	TOTAL
02 Eth Baby					+.151[1]
09 Dur Br F	-.036[2]	-.036	-.011	-.008	
14 Mo-hunt camp				+.015	
15 Mo-school			+.010		-.011
17 Fa Occup	-.031				
18 Fa-Mo Empl				-.010	
20 Fa-hunt camp				-.013	
22 Welfare	+.012	+.029			
26 Baby-Amauti	-.166	-.166		-.017	-.048
29 Fa-vio drunk				+.015	
Total	.245	.231	.021	.078	.210

[1] + signifies a direct or positive relationship between the independent and dependent variables.

[2] - signifies an inverse or negative relationship between the independent and dependent variables.

The data in Table 9-10 show that variation in incidence of otitis media infections was best predicted for the Inuit and

Indian sub-samples, followed by the total sample, the Mixed Ancestry and White sub-samples.

About 15 percent of the variance in this criterion was predicted by the ethnicity of the baby in the total sample data with infection rates higher among Native babies. There was a rather strong and inverse relationship between carrying the baby in the amauti, and a much weaker inverse relationship with the mother's educational level.

Note that while duration of breast feeding is significantly related to the criterion for all of the sub-samples it was not significantly related to the total sample. The explanation is that ethnicity serves to mark the relationship. Thus White mothers tend to nurse their babies more briefly than do Native mothers, but their children less frequently suffer from otitis media.

The data show that in the Inuit sub-sample the independent variables predicted 24 percent of the variance in the criterion. Carrying the baby in the amauti was inversely associated with the otitis media index and predicted more than two thirds of the explained variance. Duration of breast feeding and level of the father's occupation were also inversely associated, while receipt of welfare funds was directly associated with the criterion. These relationships show that low incidence of otitis media is associated with traditional child care procedures and with a good income from wage or salaried employment.

Twenty three percent of the variance in the otitis media criterion was predicted for the Indian sub-sample by the independent variables as well. The pattern of relationships is generally similar to that for the Inuit sub-sample. Carrying the baby in the traditional way again predicted more than two thirds of the explained variance, again followed by duration of breast feeding, both inverse relationships. Receipt of welfare funds and drunken violence in the father were directly associated with the criterion. Both of these relationships are expected ones and suggest the same pattern of relationships found for the Inuit sub-sample.

The data show that for the Mixed Ancestry sub-sample 8 percent of the variance in the incidence of otitis media was predicted by the independent variables. All of the relationships are very weak. Direct relationships with the criterion were found for the number of years the mother spent in hunting camps and drunken violence in the father. Inverse relationships were found with carrying the baby in the traditional way, duration of breast feeding, the number of months the father was employed, and the number of years he had lived in hunting camps. These relationships suggest that the lowest infection rates are found among infants having mothers who follow traditional baby care practices but who have not lived long out of the settlement, and having White fathers who are consistently employed.

The data for the White sample show that only 2 percent of the variance in the criterion was explained. Duration of breast feeding was inversely associated with the criterion, and, surprisingly, level of the mother's education was directly associated with the criterion, but the relationships are so weak as not to merit attention.

SKIN INFECTION

The data found in Table 9-11 show that the relationships between the independent variables and the incidence of skin infections were weak for most of the sub-samples.

Table 9-11
PROPORTIONS OF VARIANCE IN NUMBER OF SKIN INFECTIONS SUFFERED BY SAMPLE BABIES EXPLAINED BY BACKGROUND VARIABLES, BY ETHNICITY OF BABY

	INUIT	INDIAN	WHITE	MIXED	TOTAL
02 Eth Baby					+.087[1]
12 No oth child				-.024[2]	
14 Mo-hunt camp	-.019			-.032	
15 Mo-school					-.012
17 Fa Occup		-.050			
24 No/bed		-.011		-.009	
25 Pub Water		+.038			
26 Baby-Amauti		+.064		-.028	
27 Mo-alcohol	-.008	-.060			
28 Fa-alcohol		+.014		+.011	
32 Clean/house	-.014				
Total	.041	.237		.104	.099

[1] + signifies a direct or positive relationship between the independent and dependent variables.

[2] - signifies an inverse or negative relationship between the independent and dependent variables.

The data were strongest for the Indian sub-sample, followed by the Mixed Ancestry group, the total sample, and the Inuit sub-sample. No regression analyses were run for the White sample because the incidence of skin infections was very low among babies in this group.

The data show that about 10 percent of the variance in the criterion was predicted for the total sample. Native ethnicity predicted almost 9 percent of the total variance and mother's level of education was inversely associated with incidence of skin infections.

About 24 percent of the variance in the criterion was predicted by the independent variables in the case of the Indian sub-sample. Incidence of skin infections is inversely associated with carrying the baby in the traditional way, father's occupational level, the number of persons per bedroom, and with mother's consumption of alcohol. There seems to be no explanation for this latter relationship. It is directly associated with having a public water supply and with father's consumption of alcohol.

The reader will note that the direct relationship of the criterion with having access to a public water supply is contrary to expectation and to the findings of other studies. The explanation for this anomalous finding may be that public water supplies are more commonly found in larger settlements; settlements where traditional practices and social controls have more often broken down, and where, because of easier access to liquor supplies, chronic problem drinking is more commonplace. These are conditions under which child neglect may be more common and may lead to elevated incidence of skin infections in babies. Thus it is possible that the variable "access to public water supply" is here functioning as an index of these conditions.

Only 10 percent of the variance in the criterion is predicted for the Mixed Ancestry sample. The data show that skin infections are inversely associated with the mother's years in a hunting camp, the presence of other children in the home, and carrying the child in the traditional way. These relationships suggest that Mixed Ancestry children whose mothers have lived in the bush, have larger families, and care for the child in more traditional ways have fewer skin infections, perhaps because these mothers have learned cleanliness patterns under more primitive conditions. As we have noted before liquor consumption by the father probably is reflective of White status and/or greater affluence. Why it is weakly but directly associated with incidence of skin infections is not known.

Only 4 percent of the variability in the criterion is predicted by the background variables for the Inuit babies. Skin infections were weakly and inversely associated with the mother's years spent in hunting camps, with liquor consumption by the mother, and with the rated cleanliness of the house.

SCABIES INFECTIONS

Table 9-12 shows that even less of the variance in scabies infections was predicted for the samples under consideration than in the case of skin infections.

Table 9-12

PROPORTIONS OF VARIANCE IN NUMBER OF SCABIES INFECTIONS SUFFERED BY SAMPLE BABIES
EXPLAINED BY BACKGROUND VARIABLES, BY ETHNICITY OF BABY

	INUIT	INDIAN	WHITE	MIXED	TOTAL
02 Eth Baby					+.024[1]
06 Hosp del		+.055			
12 No oth child		+.010		-.017[2]	
14 Mo-hunt camp				-.022	
17 Fa Occup		-.016			
18 Fa-Mo Empl					-.027
22 Welfare		+.021			
26 Baby-Amauti				-.011	
Total		.102		.050	.051

[1] + signifies a direct or positive relationship between the independent and dependent variables.

[2] - signifies an inverse or negative relationship between the independent and dependent variables.

The strongest relationship was found for the Indian sub-sample, followed by the Mixed Ancestry sub-sample and the total sample. No significant relationships were found in the cases of the White and the Inuit sub-samples.

The data for the total sample show that only 5 percent of the variance in the scabies infection criterion was predicted by the independent variables. There were only two such predictors; Native ethnicity which explained about 2 percent of the variance, and number of months the father was employed which was inversely associated with the criterion.

The data show that 10 percent of the variance in the criterion was predicted for the Indian sub-sample. Among the Indian infants, scabies infection is directly associated with living in remote settlements, receipt of welfare funds, and with the presence of other children in the home. It is inversely associated with the father's occupational level.

These relationships, though weak, suggest that among the Indian sub-sample, scabies infection is associated with poverty and with large families living in more isolated settlements.

Only 5 percent of the variance in the scabies infection data was predicted by the independent variables for the Mixed Ancestry sub-sample. Among the Mixed Ancestry babies, scabies infection is weakly and inversely associated with years spent by the mother in hunting camps, the presence of other children in the home, and carrying the child in the traditional way. There were no significant relationships for the Inuit or the White sub-samples.

CONJUNCTIVITIS INFECTIONS

The data in Table 9-13 show that the number of conjunctivitis infections is poorly predicted by the background variables for all of the samples and particularly for the White sub-sample and the total sample.

Table 9-13
PROPORTIONS OF VARIANCE IN NUMBER OF CONJUNCTIVITIS INFECTIONS SUFFERED BY SAMPLE BABIES
EXPLAINED BY BACKGROUND VARIABLES, BY ETHNICITY OF BABY

	INUIT	INDIAN	WHITE	MIXED	TOTAL
02 Eth Baby					+.010[1]
04 Pop Mo Res		-.012[2]			
09 Dur Br F	-.020				
13 Mo works			+.016		
16 Fa-empl	-.026				
17 Fa Occup				-.033	
18 Fa-Mo Empl			-.012		
26 Baby-Amauti	-.029	-.075			-.014
28 Fa-alcohol		+.042		-.009	
29 Fa-vio drunk		+.024			
30 No/household	-.021				
34 Child Care	-.020				
35 WBC				+.085	
Total	.116	.153	.028	.127	.021

[1] + signifies a direct or positive relationship between the independent and dependent variables.

[2] - signifies an inverse or negative relationship between the indpeendent and independent variables.

This disease condition is best predicted for the Indian, followed by the Mixed Ancestry and the Inuit sub-samples. The total sample data show that only 2 percent of the variance in the criterion is predicted by the background variables. Conjunctivitis infection is statistically significantly and directly associated with Native ethnicity, and in an inverse manner with carrying the baby in the traditional way.

The Indian data show that 15 percent of the variance in the criterion is predicted by the independent variables. These data show that the criterion is strongly and inversely associated with carrying the baby in the traditional way, and is weakly inversely associated with size of the mother's place of residence. It is directly associated with liquor consumption and with drunken violence in the father.

About 12 percent of the variance in the conjunctivitis infection data is predicted by the independent variables for the Inuit sample. The Inuit data show that there are small inverse relationships between conjunctivitis infection and carrying the baby in the amauti, duration of breast feeding, the father's frequency of employment, the number of persons in the household, and the child care rating. Thus for both Native groups, and particularly for the Inuit, these data suggest that conjunctivitis infections are less frequent in larger households following more traditional child care practices, but where the father has relatively good wage employment.

Among the Mixed Ancestry sample 13 percent of the variance in the criterion is predicted. For infants in this sample reported conjunctivitis infections are strongly and directly associated with the number of well baby visits and are weakly and inversely associated with the father's occupational level and with the father's consumption of liquor. The significance of the strong relationship with number of well baby visits is difficult to interpret.

The data for the White sub-sample show that only 3 percent of the variance in the criterion was predicted. Conjunctivitis was associated very weakly and directly with employment of the mother and inversely with the father's duration of employment.

SMALL BABY

The results of the regression analysis showing the relationships between the background variables and the relative frequencies of small infants in the four sub-samples is shown in Table 9-14.

Table 9-14
PROPORTIONS OF VARIANCE IN INCIDENCE OF SMALL BABY STATUS AMONG SAMPLE BABIES
EXPLAINED BY BACKGROUND VARIABLES, BY ETHNICITY OF BABY

	INUIT	INDIAN	WHITE	MIXED	TOTAL
02 Eth Baby					+.013[1]
09 Dur Br F		-.015[2]		-.026	
13 Mo works			+.021		
18 Fa-Mo Empl		-.013			
20 Fa-hunt camp				-.030	
21 Tot +arn			-.015		
24 No/bed				+.077	
28 Fa-alcohol		+.033		+.021	
36 Prenat Clin		-.026			
39 Adoption	-.010				
Total	.010	.087	.036	.154	.013

[1] + signifies a direct or positive relationship between the independent and dependent variables.

[2] - signifies an inverse or negative relationship between the independent and dependent variables.

The strongest predictive relationships are found for the Mixed Ancestry sample, followed by the Indian, the White, the total, and the Inuit samples.

Only one percent of the variance in the criterion was predicted for the total sample. The association of Native ethnicity with small baby status is weak but statistically significant.

Of the remainder only the relationships for the Mixed Ancestry and the Indian sub-samples warrant mention. For the former, 15 percent of the variance in the small baby criterion was predicted by the independent variables. Among the Mixed Ancestry sample, small baby status was associated directly and very strongly with the crowding index and less strongly with drunken violence in the father. It was associated inversely with duration of breast feeding and with father's years of experience in hunting camps. The data for the Indian sample show that about 9 percent of the variance in the criterion was predicted. These data show that small baby status is directly associated with alcohol consumption by the father, and inversely associated with the number of prenatal visits, duration of breast feeding, and employment of the father. These relationships are as expected.

FAILURE TO THRIVE

Table 9-15 shows the relationships between the background variables and the relative frequencies of failure to thrive in the samples under consideration.

Table 9-15
PROPORTIONS OF VARIANCE IN INCIDENCE OF FAILURE TO THRIVE AMONG SAMPLE BABIES
EXPLAINED BY BACKGROUND VARIABLES, BY ETHNICITY OF BABY

	INUIT	INDIAN	WHITE	MIXED	TOTAL
02 Eth Baby					+.003[1]
04 Pop Mo Res		-.019[2]			
06 Hosp del		+.011			
08 Gravida				+.090	
09 Dur Br F	-.017	-.018			-.010
14 Mo-hunt camp				+.036	
15 Mo-school			-.043		
18 Fa-Mo Empl				+.022	
21 Tot earn		-.051	+.023		
25 Pub Water		+.027			
26 Baby-Amauti		-.012			
27 Mo-alcohol		+.026			
29 Fa-vio drunk	-.016				
30 No/household		-.011			
33 Stress Rela	+.014				
34 Child Care	-.018				
Total	.065	.175	.066	.148	.013

[1] + signifies a direct or positive relationship between the independent and dependent variables.

[2] - signifies an inverse or negative relationship between the independent and dependent variables.

The strongest predictive relationships are found for the Indian, followed by the Mixed Ancestry, the Inuit, the White and the total samples.

For the total sample only one percent of the variance in the criterion is predicted, virtually all by the variable duration of breast feeding. These data show that Native ethnicity is not statistically significantly associated with failure to thrive. There is a very weak inverse relationship with duration of breast feeding.

The data show that 18 percent of the variance in the failure to thrive index is predicted for the Indian sub-sample. Almost one third of this is explained by an inverse relationship with total family earnings. Weaker inverse relationships are found for duration of breast feeding, size of the mother's place of residence, carrying the baby in the traditional way, and with household size. The criterion is associated directly with having a publicly supplied water system, consumption of alcohol by the mother, and with living in isolated settlements. The last two of these are expected relationships.

The direct relationship of the criterion with having access to a public water supply is contrary to expectation. Again we suspect that this variable is serving here to index exposure to the problems of the larger communities which may be conducive to child neglect and the failure to thrive condition in babies.

About 15 percent of the variance in the criterion is predicted for the Mixed Ancestry sub-sample. In this group, failure to thrive is very strongly and directly associated with the number of previous pregnancies the mother has experienced and less strongly with her duration of experience of hunting camp life, and with the father's duration of employment in the preceding year. Some of the babies in this sample have Native mothers and some have White mothers. These data appear to suggest that the failure to thrive condition is more frequently encountered when the baby has a Native mother and a White father than in the reverse situation.

Among the Inuit sub-sample, only 6.5 percent of the variance in the failure to thrive criterion is predicted by the independent variables. This condition is weakly and inversely associated with the quality of child care, with duration of breast feeding, and with tendencies toward violent drunkenness of the father. It is weakly directly associated with indications of stress between relatives.

Only 6.6 percent of the variance in the failure to thrive condition is predicted by the background variables among the White babies. More than half of this variance is explained by an inverse relationship with the mother's education. The weak direct relationship found with total family earnings is difficult to explain.

SUMMARY

It is apparent from this analysis that most of the relationships between the background variables and the morbidity variables in this study have been weak. Certainly this is true of the cumulative picture: of the 61 regression analyses, in only 22, (about one third of these analyses) was more than 20 percent of the variance in the criterion explained by the background variables, and in a further 22 less than 10 percent of the variance was explained. The best prediction was achieved for the Indian sub-sample, with at least 20 percent of the variance in the morbidity index explained in 7 out of 13 analyses, followed by the Mixed Ancestry sub-sample with 6, the total sample with 5, the Inuit sub-sample with 3 and the White sub-sample with only one instance where more than 20 percent of the variance in the criterion was explained.

In terms of morbidity indices, those best explained were two global indices: the morbidity score, and the number of morbidity visits; and two respiratory illness conditions: upper respiratory infections and pneumonia. The worst explained were scabies and small baby status.

It is apparent that with these small proportions of explained variance we can say little definitively about the social determinants of these disease condtions. However, careful examination of the found relationships between the background variables and the morbidity indices, and summarized in Table 9-16, reveals some consistent patterns of relationships which are interesting and instructive. In the following sections a number of significant relationships shown in Table 9-16 are described first. Thereafter the discussion broadens and draws upon material presented throughout the chapter.

Table 9-16
NUMBERS OF RELATIONSHIPS FOUND BETWEEN THE INDEPENDENT VARIABLES AND THE MORTALITY AND MORBIDITY INDICES, BY ETHNICITY STATUS, WITH INDICATION OF DIRECTION OF THE RELATIONSHIP

	INUIT		INDIAN		WHITE		MIXED		TOTAL	
	Relation Ship		Relation Ship		Relation Ship		Relation Ship		Relation Ship	
	+	-	+	-	+	-	+	-	+	-
Bwt Baby			1					2		
Eth Baby									13	
Zone-Mo					2	1				
Pop Mo Res				4						2
Hosp del	1		4						2	
Age Mo							1			
Gravida							4			
Dur Br F		6		8		6		3		4
Vita	1	1		1					1	1
Iron	1	2	2	1	3		2		1	
No oth chil			4					2	1	
Mo works					4		1			
Mo-hunt camp		2					6	2		
Mo-School					1	2				2
Fa-empl		1								
Fa Occup	1	1		5				1	1	
Fa-Mo Empl				2		1	1	3		1
Fa-hunt camp							3	2		
Tot earn				2	1	1				
Welfare	3		4						3	
Bed/home		1		1					1	
No/bed		2	1	2		1	2	3	1	
Pub Water		1	4							
Baby-Amauti		9	1	5			1	5		4
Mo-alcohol		1	1	1						
Fa-alcohol			4				2	4		
Fa-vio drunk		1	5	1			3	1	1	
No/Household	1	2		2						
Crowd/house								1		
Clean/house		1						1		
Stress Rela	1									
Child Care		2								
WBC	1		1	1	3		4			1
Prenat Clin			2	1	2		1		2	
Adoption		1								

THE TOTAL SAMPLE

The data for the total sample show that Native ethnicity is associated with the mortality variable, and with most of the morbidity variables, though not as strongly as would have been expected. It is associated strongly with number of morbidity visits, the morbidity score, and chronic bronchitis, pneumonia, and otitis media. It is associated much less strongly with skin infections and with diarrhoea, weakly with upper respiratory diseases and infant mortality, and very weakly with scabies infections. For the remaining morbidity conditions, ethnicity explains less than two percent of the variance in the index.

The only other relationships worth noting are that duration of breast feeding and carrying the baby in the amauti were inversely associated with four of the criteria considered, and receipt of welfare funds was directly associated with morbidity criteria in 5 cases.

Thus for the sample as a whole, it is clear that Native ethnicity and receiving welfare funds are directly associated, and duration of breast feeding and carrying the baby in the amauti are inversely associated with the morbidity indices.

THE INDIAN SUB-SAMPLE

The data in Table 9-16 show that the most consistent relationship with the health criteria considered is duration of breast feeding. This was significantly inversely related to 9 of the 13 indicators. Other strong relationships were father's tendencies toward drunken violence which was directly associated with the criteria seven times; use of a public water supply, directly associated six times; and receipt of welfare funds, directly associated five times. Carrying the baby in the amauti and the father's occupational level were both inversely associated with six criteria. The indicators of residence in remote or small settlements were directly associated in four cases each, as were number of other children in the home, and father's consumption of alcoholic beverages. The crowding indices (persons per bedroom, and persons in the house) were inversely associated with four of the criteria and total family earnings was inversely associated with two of the morbidity indicators. None of the remaining independent variables were consistently associated with more than two other criterion variables.

These data reflect a rather consistent pattern. Infant health was positively associated with lengthy nursing of the child, with more traditional methods of child care such as carrying the baby in an amauti in a large household, with good wage employment for the father but little liquor consumption or drunken violence on his part, with residence in larger less isolated settlements, with presence of few other children in the home, and with not using water which is publicly supplied. All of these are generally expected relationships, with the exception of the latter.

The positive relation between use of publicly supplied water and a number of disease indicators which has been found in this study, particularly among the Indian sub-sample, is surprising and disturbing from a public health point of view. There are perhaps three relevant explanations. (1) Unhygenic practices are often observed in trucking and delivering water to Native houses in medium sized settlements. (2) Often there is lack of compliance with prescribed chlorination procedures due to a strong aversion among most Natives to the taste of chlorinated water. (3) Infection pressure is greater in medium sized settlements where water delivery by truck takes place than in small settlements and isolated hunting camps where each family fetches its own water.

THE MIXED ANCESTRY SUB-SAMPLE

The data in Table 9-16 show that the most frequent relationship is the direct one between the mother's years in a hunting camp and the morbidity indicators which was found in six criteria. In two criteria however there was an inverse relationship. The crowding indices and father's consumption of alcohol were both inversely associated with at least five of the indicators. Carrying the baby in traditional manner was inversely associated with five of the morbidity indices. Number of well baby visits and number of previous pregnancies were both directly associated with four of the morbidity indicators and father's tendencies toward drunken violence were directly associated with three and inversely associated with one. Duration of breast feeding and number of months the father was employed were both inversely associated with three criteria.

In understanding these somewhat confusing relationships it is important to bear in mind that some of the infants in this sample have White mothers and Native fathers, while others have the reverse. Generally these data suggest that some more typically Native patterns, such as more crowding, breast feeding, and carrying the baby in the amauti were associated with good infant health and these probably reflect the positive contributions of Native mothers. The relationships of mother's years in hunting camps suggest that generally such experience is associated with higher infant morbidity, but not in the cases of scabies and skin infections, where such experience may be weakly relevant to helping prevent these skin conditions in infants. The inverse relationships between father's employment and father's liquor consumption with infant ill health appear to reflect the influence of White fathers, who commonly do drink but without becoming violent. On the other hand, the direct relationships with drunken violence appears to reflect the influence of Native fathers, among whom violent tendencies while drinking are somewhat more common. The direct relationship with number of well baby visits suggests that mothers oriented to use of hospital and nursing facilities bring more infant illnesses to official attention than do mothers not so oriented.

THE INUIT SUB-SAMPLE

The data in Table 9-16 show that the most striking relationships are those between carrying the baby in the amauti (8 criteria), duration of breast feeding (7) and the crowding indices (5); all are inverse relationships. Indicators of the father's wage employment (father's frequency of employment, father's occupation and father's number of months employed) were inversely associated with the criteria three times. For three criteria the mother's years of living in a hunting camp was inversely associated and in three, receipt of welfare funds was directly associated with the morbidity indices.

The pattern reflected in these relationships is very clear. Inuit infants typically enjoy better health when they are raised in traditional contexts by mothers following traditional practices who have experience living on the land, in fairly crowded households, where the father has reasonably good wage employment. Adherence to traditional child rearing procedures reflects the strongest, as well as the most consistent, relationship.

THE WHITE SUB-SAMPLE

The data in Table 9-16 show that the strongest relationship is the inverse one between duration of breast feeding and the morbidity indicators found for seven criteria. The other noteworthy relationships are all direct: mother works, five criteria; residence in a more isolated zone, number of well baby visits, both four; and use of iron supplements, three criteria.

This pattern is a clear one, though as has been noted the relationships are rather weak almost every time. White infants enjoyed the best health when they were nursed by mothers who stayed home to care for them and when they do not live in the more isolated health zones. Their illnesses more frequently became a matter of official record where the mother was oriented toward greater use of hospital and health facilities, as reflected in number of well baby visits and use of iron supplement drops.

SUMMARY

Generally these data show two quite different patterns for the Inuit and the Indian infants on the one hand and the White babies on the other hand. The Mixed Ancestry infants reflect a pattern with elements of both.

The data for the Native infants show generally that good health was associated with more traditional child care and living arrangements, including crowded houses, and with reasonably good employment of the fathers. In addition, for the Indian babies, good health was associated with non use of a public water supply, abstinence from liquor consumption by the father, residence in larger, more accessible settlements, and with few other children in the home.

White infants more frequently enjoyed good health when they lived in the less isolated health zones and when they were nursed by mothers who stayed home to take care of them.

Mixed Ancestry infants had the best of health when they had Native mothers who raised them using traditional baby care procedures in more crowded contexts, but these mothers had not spent much time on the land. The better earnings and moderate drinking patterns of White fathers were associated with good infant health, while the violent drunken behavior of some Native fathers was associated with infant ill health.

DISCUSSION

For the most part, it was anticipated that the strength of the predicitive relationships with the morbidity criteria for the White sample would be weak. It was expected that generally the home environments into which the White infants were born, and their mothers' sophistication concerning appropriate hygienic and nutritional practices would mean that these background factors would explain little variation in the morbidity indices. This expectation proved to be true. By contrast, it was expected that for the Native samples the background variables would predict substantial amounts of the variance in the morbidity indices. Among these samples home and settlement environments were commonly less than adequate or posed special threats under certain circumstances. Similarly, the knowledge of appropriate hygienic and nutritional practices of many Native mothers was quite limited. It was interesting then to find that these expectations were not well substantiated, particularly in the case of the Inuit sub-sample.

The most surprising finding from the various analyses that have been reported on in this chapter is the low level of predictability of the morbidity indicators used. This is particularly true of the number of morbidity contacts and the morbidity index scores and of some of the morbidity conditions; especially in the Inuit sub-sample.

There are three possible reasons for this situation. A. The morbidity indicators may be faulty. B. The background variable data may have low validity. C. The relevant background data may not have been collected. Each of these possibilities is discussed in turn.

A. Faulty Morbidity Indicators.

There are reasons to suspect that the various morbidity indicators used in this study may be contaminated. They include:-

1. the propensity of some mothers to utilize the nursing station or hospital clinic "excessively".

2. The tendency of some mothers not to seek help for their infants even when they are sick - the data show that this was particularly true of Indian mothers.

3. The tendency for nurses to admit infants to the nursing

station or hospital when the nurse was mistrustful of the quality of the hygiene in the home or the mother's skill in caring for and assessing the state of health of the infant.

4. The tendency of nurses to transfer patients to hospital when this was not necessarily indicated. This may have occurred when the settlement of residence was a particularly remote or inaccessible location or when the nurse was unsure of her ability to cope adequately with the medical emergency that might evolve in a particular case or her confidence had been shaken by recent death of a patient. Although this practice of evacuation in cases of doubt and uncertainty may confound statistical analysis of health care problems, in the interests of the health of the patient it can only be commended and encouraged to continue.

5. The well established tendency for hospitals to retain in hospital for a much longer period of time infants from smaller or more isolated settlements than those from the larger, more accessible settlements.

6. The tendency to under or over report the actual incidence of disease (see Chapter 8, The Nature of the Illness, and introduction to this chapter).

All five of these "irrelevant" tendencies, as well as the actual incidence of morbidity of the child, are to some extent being measured by all of the morbidity indices derivable from the data. Because the morbidity contacts index did not distinguish between nursing stations and hospitals - and between out-patient contacts and admissions to the nursing station or hospital - it was more influenced by the first two sources of "error variance" noted above, which originate in the behaviour of the mother. However, the nurses' behaviour may also have influenced the behaviour of the mothers in the direction of increased or decreased frequency of contact with the health delivery system. The morbidity score - because it weighed admissions more heavily than out-patient contacts, and lengthy hospital stays more heavily than shorter ones - was more influenced by the biases and perhaps anxieties of nursing station and hospital personnel. But here again mothers may well have had some impact on the decisions that nurses make, although one might expect that this type of influence would have been more frequent and more consequential in the case of White than of Native mothers.

The result of this discussion is to emphasize the problematic validity of all the morbidity indicators available. It seems apparent from the data that this "error variance" was probably significantly higher in the case of the Inuit than of any of the other samples, because Inuit mothers showed a very strong propensity to numerous prenatal, well baby clinic, and morbidity visit contacts. On the other hand it should be remembered that the Inuit had the highest infant mortality rate as well and the data in this report show some evidence of a parallel bias against visiting the nursing station or hospital among the Indian sub-sample. A second reason is that a much higher proportion of the Inuit sample members lived in the small isolated settlements and were more likely to pursue the more traditional life style. Probably both of these would be associated with tendencies toward more anxious or more radical responses to infant illness, thus again inflating the morbidity measures. To the extent that these sources of error variance were especially strong in the Inuit sample, one would expect less of the variance in the morbidity indices to be explained by the background variables in the step-regression analysis and this is exactly what was found.

B. Incompleteness or Low Validity of Background Variables

The background variables used in this study were quite varied as far as their completeness, validity, and reliability are concerned. Of course many of them cannot be seriously questioned in any of these respects: data such as the ages of the husband and wife, height of the mother, gravida, number of adults and of children in the home, number of bedrooms in the home, water supply and sewage disposal arrangements, size of the settlement, and number of airplane flights into the settlement per week. Other variables probably have quite high completeness and reliability and validity as well: years of schooling of the mother and father, their years of residence in hunting camps, father's occupation and the circumstances of his employment.

Other data were much more problematic because it was somewhat doubtful whether the informant would have known the answer, or knowing it would provide an answer, or providing an answer would give an honest one. Thus, an example of the first instance is found in the case of the reported family earnings figures, which is suspected that many Native people may not accurately know, or in the case of nurses ratings of the alcohol consumption of the mother and the father, which many nurses would not accurately know. An example of the second and the third instances would again be found in the alcohol consumption ratings where the nurse was aware of the actual drinking situation but might not record accurate respones. Inaccurate responses, particularly in the case of the other ratings, may have been caused by favourable or unfavourable biases toward the family in question.

Incompleteness and error in the independent (background) variables for the members of the sample probably had two main sources. The first was the lack of accurate information among Whites about Native people, as a result of the severely restricted nature of the interaction that typically takes place between Native and White people in most northern communities. (Brody, 1975; Parsons, 1970) The second source was interviewer bias, resulting from the distinctly limited bases that Whites and Natives in the Territories have for understanding each others' ways of life. Errors and omissions in these variables for White members of the sample also had two sources. Some were due to considerations of confidentiality and the inappropriateness which sample members may have felt about divulging certain information regarding themselves. Ignorance, too, was a factor, because the Whites tended predominantly to live in the larger centres where interviewers would typically know little about the less publicly visible aspects of people's lives. Which of these sources of incompleteness and error were the most prevalent cannot be said. They would not be minimized in the case of the Inuit however, indeed they might be particularly large because of the high proportion of Inuit living in very isolated settlements where many traditional activities (eating raw frozen meat) are yet commonplace, and where there are thus significant barriers to easy understanding between White nurses and Native settlement residents.

C. Failure to Collect Relevant Background Data.

The failure to collect relevant background data may have resulted either from the expectation or the knowledge that such data could not be obtained, or because it was not known what these "actually" relevant indicators would be - i.e. they were genuinely unknown influences. Obviously there is no need to discuss why data were not collected relating to "unknown influences".

This study was relatively bold in seeking to obtain data with respect to relatively "difficult" areas such as drinking behaviour, drunken violence, child rejection, and slovenly housekeeping. How reliable and valid the results of these efforts were are questions which were discussed above, but the effort was made. In point of fact, there were no possible background variables which were seen as relevant to this study which were discussed and discarded as unobtainable. In the case of the relevant background variables considered, the best indices of the variable that might be available were identified, and efforts were made to obtain those data.

ASSESSMENT OF THE FINDINGS OF THIS CHAPTER

In the light of the preceding discussion, how are the findings of this chapter to be assessed? One of the starting points of this study was the assumption that the quality and comprehensiveness of the health care delivery system available to most residents of the Northwest Territories exceeds that available to many Canadians in the Southern Provinces. The data generally bear this out. Yet the mortality rates of Native infants in the Northwest Territories continue to be well above that for Whites in all of the Southern Provinces. Thus it must be the non-medical aspects of people's lives -- their housing, diet, provisions with respect to water and sewage, their traditions and culturally determined patterns, their life styles -- which were primarily responsible for the high mortality and morbidity rates.

Accordingly, it was anticipated that the correlations with these broad "life style" background factors would be much higher among the Native people than among the Whites. Nevertheless, the wide variation in life styles and in standards of living among Whites was expected in the context of the relatively severe Arctic environment to produce some substantial correlations with indicators of mortality and morbidity as well.

This expectation of strong predictive relationships between socio-economic background factors and the morbidity criteria was fairly well fulfilled in the case of the Mixed Ancestry and to a lesser extent for the Indian samples. As expected, these relationships were very low for the White sample; however, they were generally low for the Inuit sample as well. On the basis of the preceding discussion, there appear to be several considerations which help to explain the low relationships. Two relate to causal influences, and two to inadequacies in our data.

The first possible cause to be mentioned is the delay which patients not uncommonly experienced in reaching definitive medical care, that is secondary and tertiary Health Care Centres. It was sought to include an index of this in the form of the Hospital Delay Factor variable. However it is suspected that this variable is an inadequate index of the influence with which this study is concerned. Note that this delay is generally greater in the case of the Inuit sample members than for any of the other three samples.

The second possible cause suggested is a climatic factor, including not only outside cold extremes, and outdoor-indoor differences in temperature, but also the desiccation effect on peoples' respiratory tracts of the heating systems common in Northern houses which typically lack proper humidification features. Such conditions favour the occurrence of respiratory tract infections which account for the vast majority of Health Care contacts of Northern Native children.

The inadequacies in the data relate to the morbidity indicators, and to the background variables, which were inaccurately recorded at times. The morbidity influences clearly appear to be the most inaccurate, since they are contaminated by at least the five extraneous influences discussed above and particularly by inflation of morbidity indices. Many of the difficulties with these morbidity indices are rather easily dealt with, at least in principle. It would be possible to build into a morbidity index only those cases where the baby presents certain objective symptoms; a fever, a certain kind of rash, diarrhoea, or a "deep" cough are examples. These very specific data were not recorded for this sample. The result was that the morbidity score used in this study was based merely on differential weighting of out-patient as compared with hospital or nursing station admission, as noted earlier.

Thus the conclusion at this point must be that further precision in identifying the socio-economic conditions predisposing infants, particularly Inuit infants, to illness in the Northwest Territories must await more successful efforts in identifying more valid morbidity indices.

Nevertheless, this study has produced solid evidence of significant relationships between some of the background and lifestyle indicators considered and some of the morbidity indices. These relationships provide the basis for making a number of recommendations, specific to the individual ethnic groups, which nurses and other health care personnel can act upon. In this way some practical benefit for infants born and raised in the North can come from this study. In addition it makes clear the kinds of changes in data collection procedures which are necessary if more definitive studies are to be made in the future.

This discussion is ended with a strong recommendation that further study be made of the cohort which this project has studied. This should take the form of a follow-up study of the Health Care records of these children in order to determine the consequences of more serious morbidity events, which started in infancy, but may show up more clearly in later life. Relationships which might be discovered would include bronchiectasis and recurrent non-specific pneumonias, persistent and recurrent purulent otitis and ear drum destruction, and deviation in growth curves, etc. A comprehensive study should include not only analysis of the Health Care records of these children, but a follow-up physical examination of each child performed by a physician.

APPENDIX A

This appendix constitutes a summary of data collected for this report.

1. General Information:

Ethnic Group of Child
Sex of Child
Day of Birth of Child
Month of Birth of Child
Year of Birth of Child
Place of Birth
Health Care Facility Available
Medicare Number of Mother
Ethnic Group of Mother
Day of Birth of Mother
Month of Birth of Mother
Year of Birth of Mother
Marital Status
Place of Residence of Mother
Medicare Number of Father
Ethnic Group of Father
Day of Birth of Father
Month of Birth of Father
Year of Birth of Father
Marital Status of Father
Outcome (Completeness of data collection)
Autopsy
Day of Death of Infant
Month of Death of Infant
Year of Death of Infant
Age of Baby at Death
Type of Medical Facility Available at Mother's Place of Residence
Population of Mother's Place of Residence
The Number of Plane Flights/Week Scheduled Out of the Mother's Place of Residence
Zone of Mother's Residence
Mother's Age in Years At Infant's Birth
Index of Time Delay for Medical Services at Mother's Place of Residence

2. Maternal History:

Height of Mother
Usual Weight of Mother
Present Weight of Mother
Systolic Blood Pressure
Diastolic Blood Pressure
Family History of Diabetes
Family History of Hypertension
Family History of Chest Disease, Tuberculosis
Family History of Cardiac Disease

Family History of Renal Disease
Family History of Twins
Family History of Malformations
Contraceptive Use
Month Contraception Discontinued
Year Contraception Discontinued
Number of Pregnancies for This Mother
Number of Previous Viable Births
LNMP Date of Last Menstrual Period
Expected Date of Confinement
Quickday - Refers to Day of Quickening
Quickmon - Refers to Month of Quickening
Quickyr - Refers to Year of Quickening
Total Number of Prenatal Visits
Prenatal Classes
Identification of Risk Factors
Lab Serology
Blood Group
Rhesus Factor
Father Rh Genotype
Pap Smear - Cytological Test for Carcinoma Cervix
Drug Administered in Pregnancy

3. Previous Obstetrical History

Pregnancy Number - Refers to Previous Pregnancies
Year of Previous Pregnancy
Gestation - Refers to Duration in Weeks of Pregnancy
Type of Delivery
Complications
Outcome of Previous Pregnancy
Multiple Birth

4. Prenatal Visits

Visit Number - For Prenatal Care
Prenatal Visit - Day
Prenatal Visit - Month
Prenatal Visit - Year
Gestation
Fundus Height in Weeks
Weight of Mother
Edema
Albumin in Urine
Sugar in Urine
Systolic Blood Pressure
Diastolic Blood Pressure
Hemoglobin

5. Record Type of Summary of Labour and Delivery

Admission - Reason for Admission
Gestation
Labour Onset

Labour Induced
Indication of Induction
Analgesia - 6 Hours Prior to Delivery
Analgesic Drug #1
Dose of Analgesic mg.
Time Analgesic Administered
Analgesic Drug #2
Dose of Analgesic mg.
Time Analgesic Administered
Analgesic Drug #3
Dose of Analgesic mg.
Time Analgesic Administered
Anesthesia
Membranes Ruptured
Labour Stimulated
Delivery
Position at Delivery
Forceps Used in Delivery
Type of Forceps
Rotation
Breech
Caesarian Section
Placenta Delivery
Abnormalities of Placenta
Weight of Placenta - gm
Number of Umbilical Vessels
Episiotomy
Trauma
Blood Loss Before Delivery cc
Blood Loss After Delivery cc
Oxytocic - Administered to Mother
Fetal Heart Rate During Labour and Delivery
Meconium
Complications of Labour and Delivery

6. Infant and Time Summary of Labour and Delivery

Birthweight of Infant
Apgar Score 1 Minute
Apgar Score 5 Minutes
Asphyxia
Treatment of Asphyxia
Congenital Malformations
Admission Day
Admission Month
Admission Year
Admission Time
Labour Began - Day
Labour Began - Month
Labour Began - Year
Labour Began - Hours and Minutes
Membranes Ruptured - Day
Membranes Ruptured - Month
Membranes Ruptured - Year

Membranes Ruptured - Hours and Minutes
Second Stage - Day
Second Stage - Month
Second Stage - Year
Second Stage - Hours and Minutes
Delivered - Day
Delivered - Month
Delivered - Year
Delivered - Hours and minutes
Placenta Delivered - Day
Placenta Delivered - Month
Placenta Delivered - Year
Placenta Delivered - Hours and Minutes
Delivered By

7. Record Type of Neonatal Period

Length of Infant
Chest Circumference
Head Circumference
Admission Exam
Discharge Exam
Hemolytic Disease During Neonatal Period
Infections During Neonatal Period
Respiratory Disease During Neonatal Period
Trauma
Miscellaneous Conditions
Other Conditions

8. Patient Contact

Date of Patient Contact - Day
Date of Patient Contact - Month
Date of Patient Contact - Year
Place Where Patient Contact Took Place
Weight of Infant at Time of Patient Contact if Recorded
Denver Developmental Screening Test
Hemoglobin
Immunization of Infant
Admission to the Institution
Duration of Absence from Home - Days
Length of Infant
Age of Child in Days
Location of Contact

9. Morbidity Information

Morbidity Day
Morbidity Month
Morbidity Year
Classification of Morbidity
Age of Infant in Days

10. Nutritional Background

Breast Feeding
Duration (Month) of Breast Feeding
Bottle Feeding
Age (Month) When Introduced
Formula
Formula Nurse Advice
Special Type Formula
Age Special Formula Started
Age Special Formula Stopped
Pablum Introduced
Biscuits Introduced
Canned Meat
Fish
Vegetables
Other Cereals
Bannock or Bread
Native Meat
Eggs
Fruits or Juices
Vitamin Supplements
Vitamin Supplements Stopped
Iron Supplements
Age Iron Supplement Started
Age Iron Supplement Stopped
Family Food Source for Infant - Age
Consumption of Sweets
Month of Life When Sweets Introduced
Family Food Source
Fish Eaten
Caribou
Seal, Walrus, Whale
Availability of Native Food
Food Shortage of Family
Consumption of Meat or Fish
Consumption of Fresh Fruit and Vegetables
Sugar Consumption Per Person In Family Per Month

11. Sociological History

Number Older Siblings Alive
Number Older Siblings Dead
Care of Natural Mother
Age In Months First Separated From Natural Mother
Returned to Natural Mother
Number Months Spent In Foster Care
Permanent Adoption at Birth
Temporarily Adopted or in Foster Care at Age
Number of Adopted or Foster Home Placements Away From Own Home
Care Away From Home During Day
Care of Child Away From Home By Other Than Mother

Care of Child by Natural Mother
Age of Adopted Mother
Relationship of Adopted Mother to Natural Mother
Length of Care of Child
Other Children under 16 Yrs. in Houses
Mother's Work With Native Crafts
Work by Mother Outside the Home
Number Months Employed Last Year
Years Lived in This Settlement
Other Large Settlements
Hunting Camps
Formal Schooling - Years
Residential Schooling
Smoking By Mother Per Day
Natural Father
Head of Family
Age of Father (Years)
Frequency of Employment
Type of Occupation
Months Employed Past Year
Hunting and Trapping
Ownership of Transport
Handicraft
Absence in Month From Home, Past 2 Years
Number Years Lived in This Settlement
Years Lived In Other Settlements
Hunting Camps
Years in NWT
Years of Education
Years in Residential School

12. Sociological History

Family Cash Income
Furs and Handicraft
Welfare
Unemployment Insurance or Pension
Other Sources
Housing - Porch
Separate Bedrooms
Type of Accommodation
Number of Family Units in House
Number Male Adults in House
Number Female Adults in House
Number of Children
Number of Persons Per Bedroom
Heating
Temperature of Thermostat
Toilet Facilities
Water Supply
Hand Dipped
Bathtub
Clothing Sewn By Mother
Mother Wears Child Amauti or Backpack

Mother Wears Zippered Parka
Child's Warm Boots
Child's Warm Underwear
Pants and Parka
Alcohol Use of Mother
Violent When Drunk
Number Detentions For Drunkenness Past Year
Alcohol Use of Father
Violent When Drunk
Number Detentions for Drunkenness Past Year
Housing Crowdedness
Housing Quality
House Clean
Clothing Cleanliness
Good Repair of Clothing
Stress in Household Between Parents - Live-In Relatives
Care of Children
Treatment of Child
Comparisons of Treatment of Other Children

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GLOSSARY

Definitions have been derived from Webster's Third International Dictionary of the English Language, unabridged. (1966).

Allergen - a substance that induces allergy

Analgesia - reduced sensibility to pain without loss of consciousness

Anoxia - hypoxia of such severity or duration as to possibly result in permanent damage to the affected individual

Asphyxia - local or systematic deficiency of oxygen and excess of carbon dioxide usually as a result of interruption of respiration

BCG - Bacille-Calmette-Guerin, immunization against tuberculosis

Caries - tooth decay

Congenital - existing at or dating from birth; acquired during development in the uterus and not through heredity

DPTP - Diphtheria-Pertussis-Tetanus-Polio immunization

Dystocia - slow or difficult labour or delivery

Eclampsia - convulsions and coma occuring in a pregnant or puerperal woman, associated with hypertension, oedema and/or proteinuria

Endemic - belonging or native to a particular people or country

Epidemiology - study of the relationships of the various factors determining the frequency and distribution of diseases in a human community

Epidural anaesthesia - loss of pain sensation below the umbilicus produced by injection of an anaesthetic into the lower portion of the spine

Episiotomy - surgical incision for obstetrical purposes during delivery

Etiology - the study or theory of the factors that cause disease and the method of their introduction to the host

Fundus - the bottom of or part opposite the aperture of the internal surface of a hollow organ of the body, e.g. the large upper end of the uterus

Gastroenteritis - inflammation of the lining membrane of the stomach and the intestine

Gestation - the period of time from conception to delivery

Gravida - a pregnant woman, often used in conjunction with a term or number to indicate the number of pregnancies the woman has had

Gravidity - pregnancy

Hemoglobin - the oxygen carrying pigment of the red blood cells

Hydramnios - excessive accumulation of the amniotic fluid

Hypoglycemia - abnormal decrease of sugar in the blood

Hypoxia - a deficiency of oxygen reaching the tissues of the body

IMR - Infant Mortality Rate

Meningitis - a disease in which inflammation of the membrane enveloping the brain occurs

Morbidity - illness; sickness from disease; rate of sickness

Mortality - death

Multiparity - the condition of having borne a number of children

Neonatal - relating to, or affecting, the newborn infant, especially during the first 28 days after birth

Oedema - an abnormal accumulation of fluid in tissues of the body, causing puffy swelling

Otolaryngology - a branch of medicine which deals with the ear, nose and throat

Parity - the condition of a woman with respect to her having borne viable offspring

Parturition - the action or process of giving birth

Perinatal - occuring within the first 7 days of birth

Pre-eclampsia - a toxic condition in late pregnancy characterized by a sudden rise in blood pressure, excessive gain in weight and other symptoms

Primigravid - pregnant for the first time

Primiparous - bearing young for the first time

Trauma - an injury or wound

URI - Upper Respiratory Infection

VDRL - blood test for syphilis

WBC - Well Baby Clinic

POOR

QUALITY

ORIGINAL